



EPA Region 5 Records Ctr.



361631

PROJECT SPECIFICATIONS

WATER MAIN EXTENSIONS

HIMCO SITE
ELKHART, INDIANA

Prepared For:
Himco Site Trust

Contract No. 039611 (12)

March 19, 2009

MARCH 2009
REF. NO. 039611 (12)
This report printed on recycled paper

Prepared by:
Conestoga-Rovers
& Associates

651 Colby Drive
Waterloo, Ontario
Canada N2V 1C2

Office: 519•884•0510
Fax: 519•884•0525

TABLE OF CONTENTS

INSTRUCTIONS TO BIDDERS

1.	FORMS OF PROPOSALS	1
2.	WITHDRAWALS	1
3.	BID BOND - CHECKS	1
4.	CONTRACT	1
5.	RETURN OF PLANS AND SPECIFICATIONS	2
6.	BEFORE STARTING CONSTRUCTION	2
7.	REJECTION OF BIDS	2
8.	AFFIDAVIT	2
9.	PAYMENT BOND	2
10.	PERFORMANCE BOND	3
11.	LIABILITY INSURANCE	3
12.	BUY AMERICAN	3
13.	DISADVANTAGED BUSINESS ENTERPRISE	4
14.	QUALIFICATION OF BIDDERS	4
15.	CONDITIONS ON SITE	4
16.	ELEVATIONS	4
17.	MAINTENANCE BOND	5
18.	LIQUIDATED DAMAGES	5

AGREEMENT

GENERAL REQUIREMENTS

1.	REFERENCES	1
2.	DEFINITIONS	1
3.	INTERPRETATIONS	1
4.	CHANGES IN PLANS	1
5.	SUBLETTING	2
6.	QUALITY OF MATERIAL AND WORK	2
7.	INSPECTION	2
8.	INJURIES TO PERSONS AND PROPERTY	2
9.	NONLIABILITY	3
10.	INDEMNIFICATION CLAUSE FOR HIMCO SITE TRUST CONTRACTS	3
11.	SANITARY CONVENIENCES: NUISANCES	3
12.	FIRE HYDRANTS	4
13.	MAINTENANCE AND PROTECTION OF TRAFFIC: BARRICADES, BARRIERS, TRAFFIC SIGNS, LIGHTS, AND WATCHMEN	5
14.	DISORDERLY EMPLOYEES	5
15.	ORDER AND PROGRESS OF DOING WORK	5
16.	MONUMENTS OR STAKES	6
17.	PUBLIC CONVENIENCE	6
18.	WAGE RATES	6
19.	NONDISCRIMINATION	6
20.	CONTRACTOR'S INSURANCE	7
21.	PERMITS AND LICENSES	7
22.	ADDITIONAL WORK	7
23.	NON-REIMBURSEMENT ITEMS	8

TABLE OF CONTENTS

24.	CONSTRUCTION SITE VIDEO	8
25.	IOSHA REGULATIONS	8
26.	DEDUCTIONS FOR UNCORRECTED WORK.....	8
27.	PAYMENT	8
28.	SUPERINTENDENCE BY CONTRACTOR.....	8
29.	NOTIFICATION OF CHANGES	9
30.	VARIANCES WITH STATE HIGHWAY SPECIFICATIONS	9
31.	COOPERATION WITH PUBLIC AND PRIVATELY OWNED UTILITIES	9
32.	PUBLIC UTILITIES AND PRIVATE STRUCTURES.....	10
33.	CONTRACTOR'S RESPONSIBILITY FOR MATCHING OLD WORK	11
34.	UNDERGROUND SPRINKLING SYSTEMS.....	11
35.	RESPONSIBILITY FOR SETTLEMENT	11
36.	CONSTRUCTION NOISE.....	11
37.	WORK PERFORMED BY HIMCO SITE TRUST EMPLOYEES	11
38.	PAYMENT OF PERIODICAL ESTIMATES AND FINAL PAYMENT.....	12
39.	APPROXIMATE QUANTITIES	13
40.	CONDITIONAL BID	13
41.	HOUSE CONNECTIONS	13
42.	CROSS CONNECTIONS.....	14
43.	PROTECTION OF PUBLIC.....	14
44.	DEWATERING.....	14
45.	RECORD DRAWINGS	15

SPECIAL PROVISIONS

1.	PROJECT SIGNBOARDS	1
2.	TESTING	1
3.	TEMPORARY FACILITIES AND CONTROLS	1
4.	WATER MAIN	1
5.	WATER SERVICE LATERALS.....	1
6.	WORK ON WEST BRISTOL STREET.....	2
7.	FITTINGS	2
8.	FINAL CONNECTIONS.....	2
9.	SERVICES ON PRIVATE PROPERTY.....	2

CONSTRUCTION SPECIFICATIONS

PART 1	SITE PREPARATION	1
PART 2	SANITARY AND STORM SEWER CONSTRUCTION	8
PART 3	STRUCTURES.....	16
PART 4	BITUMINOUS PAVEMENT.....	25
PART 5	RIGID PAVEMENT	26
PART 6	MISCELLANEOUS CONSTRUCTION.....	27
PART 7	TRAFFIC AND SIGNALIZATION CONSTRUCTION	31
PART 8	LANDSCAPE.....	39
PART 9	WATER CONSTRUCTION	41
PART 10	TESTS.....	52
PART 11	RECORD DRAWINGS	58

TABLE OF CONTENTS

BID OFFER

SCHEDULE OF UNIT PRICES	2
CONTRACT 2009-001	2
SUMMARY OF CONTRACT PRICES	5
LIST OF SUBCONTRACTORS AND SUPPLIERS	6
TIME OF THE ESSENCE AND LIQUIDATED DAMAGES	7
BIDDER'S EXPERIENCE IN SIMILAR WORK	9
BIDDER'S SUPERVISORY STAFF	10
AGREEMENT TO BOND - PERFORMANCE AND PAYMENT	11

INSTRUCTIONS TO BIDDERS

1. FORMS OF PROPOSALS

All proposals shall be made on the printed forms, to be obtained from the Himco Site Trust (Trust) and enclosed in a sealed envelope directed to Mr. Tom Lenz of the Himco Site Trust, c/o Bayer HealthCare LLC, 430 S. Beiger Street, Mishawaka, IN, 46544-3207, and endorsed on the outside of the envelope with the title of the work.

Each bid shall be accompanied by a contain a statement of the bidder's experience, the bidder's proposed plan or plans for performing the public work, and the equipment that the bidder has available for the public work.

The place of residence of each bidder shall be given after the bidder's signature, which shall be written in full. When firms bid, the individual names of the members shall be signed in full and the firm name added.

2. WITHDRAWALS

A bidder may withdraw his/her proposal at any time prior to the expiration of the period during which proposals may be submitted, by written request of the bidder, which request must be signed in the same manner and by the same person or persons who signed the proposal. After the expiration of such period no proposal shall be withdrawn or modified.

3. BID BOND - CHECKS

Each proposal shall be accompanied by a certified check, cashier's check or bid bond, payable to the Himco Site Trust, for an amount not less than five (5) percent of the bid, but in no case shall any check be less than the sum of Five Hundred (\$500) dollars. In case the bid is not accepted, this check or bond will be returned to the bidder; but if the bid is accepted and the bidder shall refuse or neglect to enter into a Contract with the Himco Site Trust within ten (10) days from the time that the bidder shall have been notified of the acceptance of the bid, said check or bond shall be forfeited to said Himco Site Trust as ascertained and liquidated damages for failure to do so.

The Himco Site Trust reserves the right to hold the proposal of the three (3) lowest bidders for a period of thirty (30) days after the opening thereof, during which time the bidders may not withdraw their proposals.

4. CONTRACT

The bidder to whom award is made shall be required to execute a written Contract, hereinafter referred to as the "contract", and to furnish good and approved performance and payment bonds as herein specified, within ten (10) days after being notified of the acceptance of the bid. If the bidder to whom the first award is made fails to enter into a Contract, as

herein provided, the award may be annulled and the Contract let to the next highest bidder who is reliable and responsible in the opinion of the Himco Site Trust and such bidder shall fulfill every stipulation embraced herein as if the bidder were the original party to whom the award is made.

5. RETURN OF PLANS AND SPECIFICATIONS

The plans and specifications are the property of the Himco Site Trust and must be returned in good order if requested.

6. BEFORE STARTING CONSTRUCTION

Before undertaking each part of the Construction or any other Work required herein, hereinafter sometimes referred to as the "Work", CONTRACTOR shall carefully study and compare the Contract Documents and Plans and check and verify pertinent figures shown thereon and all applicable field measurements. CONTRACTOR shall promptly report in writing to the Himco Site Trust any conflict, error, ambiguity, omissions, or discrepancy which CONTRACTOR may discover and shall obtain a written interpretation or clarification from the Himco Site Trust before proceeding with any Work affected thereby. Failure to discover or correct errors, conflicts, ambiguities, omissions, or discrepancies shall not relieve the CONTRACTOR of full responsibility for unsatisfactory work, faulty construction, or improper operation resulting there from nor from rectifying such at the CONTRACTOR's own expense.

7. REJECTION OF BIDS

The Himco Site Trust reserves the right to reject any and all bids, or to waive or correct irregularities in bids, should they deem it is to the interests of the Himco Site Trust to do so.

8. AFFIDAVIT

Each bidder is required to file an affidavit that such bidder has not entered into any combination or agreement relative to the price to be bid by a person, to prevent a person from bidding or to induce a person to refrain from bidding and that such bid is made without reference to any other bid.

9. PAYMENT BOND

The successful bidder shall execute and deliver a payment bond to the Himco Site Trust, approved by the Himco Site Trust, in an amount at least equal to the Contract price, providing for the payment of all indebtedness to a person for labor and service performed, material furnished or services rendered. The payment bond must state that it is for the benefit of the Subcontractors, laborers, material supplies, and those performing services; and that a modification, omission, or addition to the terms and conditions of the work Contract,

plans, specifications, drawings or profile; a defect in the work Contract; or a defect in the proceedings preliminary to the letting and awarding of the work Contract does not discharge the surety. Said bond to be signed by a recognized surety company authorized to do business in the State of Indiana. Said bond may not be released until one year after the final settlement with the CONTRACTOR.

If the surety on any Bond furnished by CONTRACTOR is declared a bankrupt or becomes insolvent or its right to do business is terminated in the state where the Project is located, CONTRACTOR shall within ten (10) days thereafter substitute another Bond and surety, both of which must be acceptable to the Himco Site Trust.

10. PERFORMANCE BOND

The successful bidder shall execute and deliver a performance bond to the Himco Site Trust in an amount at least equal to the CONTRACTOR's bid, conditioned for the faithful performance and completion of the work, according to the terms of the Contract. Said bond shall be signed by a recognized surety company; authorized to do business in the State of Indiana, and shall provide that a modification, omission, or addition to the terms and conditions of the work Contract, plans, specifications, drawings or profile; a defect in the work Contract, or a defect in the proceedings preliminary to the letting and awarding of the work Contract does not discharge the surety. Said bond to be signed by a recognized surety company authorized to do business in the State of Indiana. Said bond may not be released until one year after the final settlement with the CONTRACTOR.

If the surety on any Bond furnished by CONTRACTOR is declared a bankrupt, or becomes insolvent, or its right to do business is terminated in the state where the Project is located, CONTRACTOR shall within ten (10) days thereafter substitute another Bond and surety, both of which must be acceptable to the Himco Site Trust.

11. LIABILITY INSURANCE

CONTRACTOR shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and furnished and shall provide protection from claims set forth below which may arise out of or result from CONTRACTOR's performance and furnishing of the Work and CONTRACTOR's other obligations under the Contract Documents, whether it is to be performed or furnished by the CONTRACTOR, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for whose acts any of them may be liable.

12. BUY AMERICAN

The CONTRACTOR agrees that preference will be given to domestic construction material and domestically made and assembled equipment by the CONTRACTOR, Subcontractor, and Suppliers in the performance of the Contract.

13. DISADVANTAGED BUSINESS ENTERPRISE

The CONTRACTOR shall take affirmative steps to assure that qualified small businesses, minority owned businesses (MBE), and businesses owned by women (WBE) are used when possible as sources of supplies, equipment, construction, and services. The CONTRACTOR shall take affirmative steps to use the services of the Small Business Administration, the Women Business Enterprise, and the Officers of Minority Business Enterprise of the U.S. Department of Commerce.

14. QUALIFICATION OF BIDDERS

No bid will be accepted from or Contract awarded to any person, firm, or corporation, that is in arrears to the Himco Site Trust upon any debt or Contract, or who has failed to execute in whole or in part, in a satisfactory manner, any Contract with the Himco Site Trust; or who is in default as to surety or otherwise upon any obligation to the Himco Site Trust.

Persons, firms, or corporations submitting proposals shall demonstrate to the satisfaction of the Himco Site Trust, that they have the proper facilities, expert laborers, and experience to execute the Contract in a proper manner, otherwise, their bids will be rejected.

15. CONDITIONS ON SITE

Preliminary to bidding, CONTRACTORS are required to personally visit the site of the proposed work and thoroughly familiarize themselves as to the nature and location of the work, the topography of the ground, the character, quality and quantity of material to be encountered and the kind of equipment needed during the prosecution of the work. The CONTRACTOR shall thoroughly familiarize himself/herself with the Contract documents, local laws and ordinances and all matters which can in any way affect the work under the Contract. No verbal agreement, understanding, or conversation with an agent or employee of the Himco Site Trust, either before or after the execution of the Contract, shall affect or modify any of the terms or obligations herein contained.

16. ELEVATIONS

The elevations shown on any plans or profiles accompanying the Contract documents are reasonably correct but are not guaranteed to be absolutely so and together with any schedule of quantities, are to be used as basis of estimate.

All elevations indicated or specified refer to the North American Vertical Datum of 1988 (NAVD88) and the horizontal reference is the North American Datum of 1983 (NAD83). Elevations are expressed in feet and decimal parts thereof, or in feet and inches.

17. MAINTENANCE BOND

The CONTRACTOR to whom the within Contract is awarded shall, within ten (10) days after the date of acceptance, furnish a maintenance bond in an amount at least equal to thirty (30) percent of the Contract price, guaranteeing for a period of three (3) years after the date of acceptance of the work by the owner that all workmanship and materials entering into the Contract are in accordance with the plans and specifications. The CONTRACTOR shall remove all defects due to faulty workmanship and/or materials and shall pay for any damage to other work resulting therefrom which shall appear within the guarantee period.

18. LIQUIDATED DAMAGES

On this Contract, the amount assessed as Liquidated Damages will be \$1,500.00 per calendar day as determined in accordance with the Form of Bid.

END OF SECTION

BID OFFER

BY: NAME: _____

ADDRESS: _____

TO: The Himco Site Trust, hereinafter called "Himco".

FOR: Watermain Extension

UNDER: Contract 2009-001

SCHEDULE OF UNIT PRICES

CONTRACT 2009-001

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Estimated Quantity</i>	<i>Rate</i>	<i>Amount</i>
1.	Site Preparation:				
	a) Clearing and grubbing Westwood Dr. Sta. 123+40 to 125+10	L.S.		\$	\$
	b) Temporary facilities and controls	L.S.		\$	\$
	c) Traffic control	L.S.		\$	\$
	d) Surveying	L.S.		\$	\$
2.	12" DI Cl. 52watermain, including restoration:				
	a) Plainfield Dr. Sta. 0+13 to 2+24	Foot	194	\$	\$
	b) Westwood Dr. Sta. 100+18 to 135+02	Foot	3492	\$	\$
	c) Highland Blvd. Sta. 400+11 to 404+00	Foot	388	\$	\$
	d) Highland Blvd. Sta. 404+00 to 404+85	Foot	85	\$	\$
3.	8" DI Cl 52 watermain, including restoration:				
	a) Midland Drive Sta. 200+18 to 203+15	Foot	300	\$	\$
	b) Northwood Dr. Sta. 300+14 to 305+89	Foot	567	\$	\$
4.	Fitting, including thrust block:				
	a) 12"x12" tee	Each	1	\$	\$
	b) 12"x12" cross	Each	1	\$	\$
	c) 12"x8" tee	Each	2	\$	\$
	d) 8"x8" cross	Each	1	\$	\$
	e) 12"x6" hydrant tee	Each	7	\$	\$
	f) 8"x6" hydrant tee	Each	1	\$	\$
	f) 12" - 45° bend	Each	1	\$	\$
	g) 12" 22-1/2° bend	Each	2	\$	\$
	h) 12" cap	Each	3	\$	\$
	i) 8" cap	Each	2	\$	\$
	j) 8" - 22-1/2° bend	Each	1	\$	\$
5.	Gate valve and box:				
	a) 12"	Each	4	\$	\$
	b) 8"	Each	1	\$	\$
6.	Hydrants, including lead, valve and box	Each	8	\$	\$

SCHEDULE OF UNIT PRICES

CONTRACT 2009-001

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Estimated Quantity</i>	<i>Rate</i>	<i>Amount</i>
7.	Service to property line, including main cock, 1" Type K copper, service cock and box installed by trenchless method under existing road surfaces:				
	a) Short side	Each	18	\$	\$
	b) Long side	Each	21	\$	\$
8.	Watermain swabbing, testing, disinfection and flushing	L.S.		\$	\$
9.	Final connection to existing mains, including excavation, tapping sleeve and valve, tapping of existing main, bedding, backfill, and restoration				
	a) To 30" main on John Weaver Parkway	L.S.		\$	\$
	b) To 30" main on West Bristol St.	L.S.		\$	\$
10.	Service line, connection, interior plumbing, well abandonment and restoration on private property				
	a) 27876 Plainfield Dr.	L.S.		\$	\$
	b) 54093 Westwood Dr.	L.S.		\$	\$
	c) 54106 Westwood Dr.	L.S.		\$	\$
	d) 54111 Westwood Dr.	L.S.		\$	\$
	e) 54124 Westwood Dr.	L.S.		\$	\$
	f) 54125 Westwood Dr.	L.S.		\$	\$
	g) 54145 Westwood Dr.	L.S.		\$	\$
	h) 54146 Westwood Dr.	L.S.		\$	\$
	i) 54161 Westwood Dr.	L.S.		\$	\$
	j) 54162 Westwood Dr.	L.S.		\$	\$
	k) 54179 Westwood Dr.	L.S.		\$	\$
	l) 54180 Westwood Dr.	L.S.		\$	\$
	m) 54197 Westwood Dr.	L.S.		\$	\$
	n) 54198 Westwood Dr.	L.S.		\$	\$
	o) 54212 Westwood Dr.	L.S.		\$	\$
	p) 54215 Westwood Dr.	L.S.		\$	\$
	q) 54231 Westwood Dr.	L.S.		\$	\$
	r) 54248 Westwood Dr.	L.S.		\$	\$
	s) 54253 Westwood Dr.	L.S.		\$	\$
	t) 54260 Westwood Dr.	L.S.		\$	\$
	u) 54271 Westwood Dr.	L.S.		\$	\$
	v) 54280 Westwood Dr.	L.S.		\$	\$

SCHEDULE OF UNIT PRICES

CONTRACT 2009-001

<i>Item</i>	<i>Description</i>	<i>Unit</i>	<i>Estimated Quantity</i>	<i>Rate</i>	<i>Amount</i>
10.	Service line, connection, interior plumbing, well abandonment and restoration on private property (cont'd)				
	w) 54287 Westwood Dr.	L.S.		\$	\$
	x) 54305 Westwood Dr.	L.S.		\$	\$
	y) 27947 Westwood Dr.	L.S.		\$	\$
	z) 27964 Westwood Dr.	L.S.		\$	\$
	aa) 27948 Westwood Dr.	L.S.		\$	\$
	ab) 27919 Westwood Dr.	L.S.		\$	\$
	ac) 27928 Westwood Dr.	L.S.		\$	\$
	ac) 27883 Westwood Dr.	L.S.		\$	\$
	ad) 27853 Westwood Dr.	L.S.		\$	\$
	ae) 27908 Westwood Dr.	L.S.		\$	\$
	af) 54239 Northwood Dr.	L.S.		\$	\$
	ag) 54240 Northwood Dr.	L.S.		\$	\$
	ah) 54250 Northwood Dr.	L.S.		\$	\$
	ai) 54253 Northwood Dr.	L.S.		\$	\$
	aj) 54271 Northwood Dr.	L.S.		\$	\$
	ak) 54274 Northwood Dr.	L.S.		\$	\$
	al) 54290 Northwood Dr.	L.S.		\$	\$
11.	Restoration of West Bristol Street road surfaces	L.S.		\$	\$
	TOTAL				\$

SUMMARY OF CONTRACT PRICES

(To be completed by all Bidders)

The Bid Price is made up as follows:

1.	Items	\$ _____
2.	Contingency Allowance	\$ <u>75,000.00</u>
	SUBTOTAL	\$ _____
	Tax	\$ _____
	TOTAL BID PRICE	\$ _____ *

Repeat Total Tender Price below in writing:

*This figure must appear on the "Signing Page".

LIST OF SUBCONTRACTORS AND SUPPLIERS

The Bidder will complete the following List of Subcontractors and Suppliers (name one only) proposed to carry out each item of work. The Bidder will be bound, except as otherwise provided in the Contract document, to use the Subcontractors and Suppliers named below for the work of this Contract. Where the Bidder does not intend to employ a Subcontractor, insert the words "Own Forces" in the space provided.

Item of Work	Subcontractor/Supplier	Address of Subcontractor	Value of Subcontract Work
1. Supply pipe and fittings	_____	_____	_____
2. Supply of granulars	_____	_____	_____
3. Install watermain	_____	_____	_____
4. Testing and disinfection	_____	_____	_____
5. Services on private property	_____	_____	_____
6. Plumbing	_____	_____	_____
7. Abandon wells	_____	_____	_____
8. Asphalt paving	_____	_____	_____
9. Concrete paving	_____	_____	_____
10. Traffic control	_____	_____	_____
11. _____	_____	_____	_____
12. _____	_____	_____	_____
13. _____	_____	_____	_____
14. _____	_____	_____	_____

Failure to list all Subcontractors and Suppliers may disqualify the Bid.

TIME OF THE ESSENCE AND LIQUIDATED DAMAGES

TIME OF THE ESSENCE

Time shall be deemed to be of the essence of this contract.

The Contractor, having carefully examined the site of the proposed work, and having read, understood and accepted the provisions, plans, specifications and conditions attached hereto, each and all of which forms part of the Bid, agrees to substantially perform the work of this contract on or before October 2, 2009, and to complete all of the work of this contract on or before October 16, 2009.

LIQUIDATED DAMAGES

It is agreed by the parties to the Contract that in case all the work called for under the Contract is not completed within the number of working days or completion date as set forth in this Contract, damage will be sustained by the Himco Site Trust and that it is and will be impracticable and extremely difficult to ascertain and determine the actual damage which the Himco Site Trust will sustain in the event of and by any reason of such delay and the parties hereto agree that the Contractor will pay to the Himco Site Trust the sum as stipulated in the Instructions to Bidders for Liquidated Damages for each and every working day delay in finishing the work in excess of the number of working days prescribed, and it is agreed that this amount is an estimate of the actual damage to the Himco Site Trust which will accrue during the period in excess of the prescribed number of working days or stipulated dates.

The Himco Site Trust may deduct any amount under this paragraph from any monies that may be due or payable to the Contractor on any account whatsoever. The Liquidated Damages payable under this paragraph are in addition to and without prejudice to any other remedy, action or other alternative that may be available to the Himco Site Trust. If the time available for the completion of the work is increased or decreased because of an overrun of an item in the Contract, the Himco Site Trust may increase or decrease the number of days by adding or subtracting therefrom, as the case may be, a number of days calculated on the average daily production of the most productive 50 percent of the work time shown on the Contractor's schedule, divided into the difference between the actual quantity and the estimated bid quantity, provided that this basis of calculation may not be used where, in the opinion of the Himco Site Trust, all or any of the relevant items are carried out concurrently. The working days stipulated in the contract do not provide for the completion of work under Provisional Items and additional working days may be allowed by the Himco Site Trust for work carried out under any Provisional item in the contract or where additional work is added to the contract.

Liquidated damages will apply separately and independently to each of the above-noted dates of substantial performance and completion of contract. Specifically, liquidated damages will apply to substantial performance for every calendar day after October 2, 2009 until substantial performance is achieved and to contract completion for every calendar day after October 16, 2009 until the work of the contract is completed.

CONTRACT 2009-001

I/We, the undersigned, have carefully examined the site of the proposed works, and having read, understood and accepted the Provisions, Plans, Specifications and Conditions attached hereto, each and all of which forms part of this bid, hereby offer to furnish all machinery, tools, labour, apparatus, plant and other means of construction; all materials except as otherwise stated in the Contract; and to complete the work in strict accordance with the Provisions, Plans, Specifications and Conditions hereto attached for the prices shown in the attached Schedule of Unit Prices which form part of this bid for the total bid price

of _____
_____ DOLLARS (\$) _____).

I/We, agree that we have received Addenda ___ to ___ inclusive, and the total Bid Price includes provisions set out in such addenda.

Attached to this tender is a certified cheque or bid bond in the amount of \$_____ made payable to the Himco Site Trust, the proceeds of which, upon acceptance of this bid, shall constitute a deposit which shall be forfeited to Himco if I/We fail to file with Himco the complete Performance Bond and Payment Bond specified in the Information for Bidders and an executed form of Agreement of the performance of work within seven (7) days from the date of notification of the acceptance of this bid by Himco. Enclosed are agreements to bond (Performance and Payment) from

Name Of Company

I/We hereby agree that notification of acceptance of this bid shall be in writing, and may be sent by prepaid post, and if sent by prepaid post, acceptance shall be deemed to have been made on the date of the mailing of such notification.

SIGNED, SEALED AND DELIVERED AT _____, this _____ day of _____, 2004.

NAME OF BIDDER (Print or Type)

ADDRESS AND TELEPHONE NUMBER OF BIDDER (Print or Type)

WITNESS (required if
Bidder is not a corporation)

SIGNATURE (and title) OF AUTHORIZED OFFICIAL
OR PRINCIPAL (I/We have the authority to bind the
Corporation)

WITNESS (if required)

SIGNATURE (and title) OF AUTHORIZED OFFICIAL
OR PRINCIPAL (I/We have the authority to bind the
Corporation)

BIDDER'S EXPERIENCE IN SIMILAR WORK

<i>Year Completed</i>	<i>Description of Contract</i>	<i>For Whom Work Completed</i>	<i>Name of Consultant</i>	<i>Value</i>

Qualifications and Experience

This image shows a single page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears slightly aged or off-white. There is no handwriting or other markings on the page.

AGREEMENT TO BOND - PERFORMANCE AND PAYMENT

For THE HIMCO SITE TRUST

We, the undersigned, hereby agree to become bound as surety for

in a performance bond totalling One Hundred Percent (100%) of the Total Contract Amount, and in a payment bond totalling One Hundred Percent (100%) of the Total Contract Amount, and conforming to the instruments of Contract attached hereto, for the full and due performance of the works shown as described herein, if the Bid for

is accepted by the Owner.

It is a condition of this Agreement that if the above mentioned Bid is accepted, application for the above mentioned Bonds must be completed with undersigned within ten (10) days of acceptance of the bid related thereto, otherwise this Agreement shall be null and void.

DATED this _____ day of _____, 2004.

Name of Bonding Company

BY:

Signature of Authorized Person
Signing for Company

(Company Seal)

Position

END OF SECTION

AGREEMENT

THIS AGREEMENT made in triplicate this _____ day of _____, 2009.

BETWEEN _____ of the
name
_____ in the
City/town

State

hereinafter called the "Contractor"

THE PARTY OF THE FIRST PART

and

THE HIMCO SITE TRUST

hereinafter called the "Owner"

THE PARTY OF THE SECOND PART

WITNESSETH, that the party of the first part, for and in consideration of the payment or payments specified in the Bid for this work, hereby agrees to furnish all necessary machinery, tools, equipment, supplies, labour and other means of construction and, to the satisfaction of the Engineer, to do all the work as described hereafter, furnish all the materials except as herein otherwise specified, and to complete such works in strict accordance with the plans, specifications and Bid therefore, which are to be read in conjunction herewith and form part of this present Agreement as fully and completely to all intents and purposes as though all the stipulations hereof have been embodied herein.

DESCRIPTION OF THE WORKS

Contract No. 2009-001

WATERMAIN EXTENSION

ELKHART, INDIANA

INCONSIDERATION WHEREOF, Said party of the second part agrees to pay to the Contractor for all work done, the unit prices on the Bid.

The agreement shall enure to the benefit of and be binding upon the heirs, executors, administrators and assigns of the parties hereto.

IN WITNESS WHEREOF, the Contractor and the Owner have hereunto signed their names and set their seals on the day first above written.

FOR THE CONTRACTOR

Witness

Name and Position Held

Date

Date

Witness

Name and Position Held

Date

Date

Witness(es) and Position(s) Held
(Not Required if a Corporation and Seal is Used)

Signature of Contractor, Position Held
and Seal of the Corporation

FOR THE OWNER

Witness

Name and Position Held

Date

Date

Witness

Name and Position Held

Date

Date

Witness(es) and Position(s) Held
(Not Required if a Corporation and Seal is Used)

Signature of Owner, Position Held
and Seal of the Corporation

GENERAL REQUIREMENTS

1. REFERENCES

The numbered divisions of the specifications are herein designated as "sections", each being referred to by the number standing at its beginning. Where reference is herein made to any such section number, it shall be considered equivalent to a quotation of that section.

2. DEFINITIONS

When, in these specifications, the words, Himco Site Trust or "The Trust" are used, they shall be understood to refer to the Himco Site Trust or its authorized agents acting within the authority specially conferred upon them by the Himco Site Trust.

Wherever, in these specifications, the words "The ENGINEER" are used they shall be understood to refer to the consulting Engineer or his deputies or assistants, acting within the authority specifically conferred upon them by the consulting Engineer.

Wherever, in these specifications, the words "The CONTRACTOR" are used, they shall be understood to refer to the person or persons who have entered into the Contract as party or parties of the second part, or his or her heirs, executors, administrators, assigns or successors.

3. INTERPRETATIONS

In case of any actual or alleged disagreement or discrepancy between the Contract, these specifications and the plans for the work on file in the office of the CRA, the language and provisions of the Contract shall take precedence and prevail; and the ENGINEER shall determine in each case whether the specifications or the plans shall be followed.

4. CHANGES IN PLANS

The ENGINEER will have the right to make such changes in the plans and specifications of the work as he may deem necessary or desirable or to provide for unexpected conditions or contingencies that may develop at any time after the signing of the Contract, or during the progress or before the final acceptance of the work. The CONTRACTOR shall accept such changes when made as a part of the original Contract and specifications, subject to all the provisions and conditions thereof. But before any such changes shall become valid and before the CONTRACTOR shall begin the particular work involved in such changes the increased or decreased cost of the work by reason of such changes above or below what it would have been under the original plans and specifications shall be agreed upon in writing between the Himco Site Trust and the CONTRACTOR. It is expressly understood and agreed that such alterations, omissions or additions shall in no way violate or annul the Contract.

5. SUBLETTING

The CONTRACTOR shall not assign nor transfer the Contract nor sublet the work or any part thereof, except on recommendation of the ENGINEER and with the approval of the Himco Site Trust.

In the case where the CONTRACTOR sublets or makes a subcontract contrary to this section, the CONTRACTOR shall pay to the Himco Site Trust a sum to be assessed by The Trust, not exceeding twenty five (25) percent of the total cost of the work bid upon, and which shall be deemed liquidated and ascertained damages.

6. QUALITY OF MATERIAL AND WORK

The judgment and decision of the ENGINEER as to whether the material supplied and the work done under the Contract comply with the requirements of these specifications, will be conclusive and final. No material shall be used in the work until it has been examined and approved by the ENGINEER, or his authorized agents. All rejected material shall be promptly removed from the work and replaced with that which is acceptable to the ENGINEER and all improper or defective work must be corrected and if necessary, removed and reconstructed so as to comply with these specifications and the instructions of the ENGINEER.

In all matters of detail not specifically covered by the specifications, the work shall be well and skillfully done in accordance with the best trade or art customs and standards for work of like character and purpose.

7. INSPECTION

The ENGINEER may provide for the inspection, by assistants and inspectors under his direction, of all materials used and all work done under the Contract. Such inspection may extend to all or any part of the work and to the preparation or manufacture of materials to be used, whether within the limits of the work on the street, or at any other place. The ENGINEER and his inspectors shall have free access to all places or parts or other places where any part of the materials to be used is procured, manufactured or prepared. The CONTRACTOR shall furnish the ENGINEER all information relating to the work and the material which the ENGINEER may deem necessary to be pertinent and with such samples of materials as may be required. The CONTRACTOR shall at his/her expense, supply inspectors with such labor and assistance as may be necessary in the handling of materials for proper inspection. Inspectors will have authority to reject defective material and to suspend any work that is being improperly done, subject to the final decision of the ENGINEER. Inspectors shall have no authority to permit deviations from or to relax any of the provisions of these specifications without the written permission or instruction of the ENGINEER; nor delay the CONTRACTOR by failure to inspect materials and work with reasonable promptness.

8. INJURIES TO PERSONS AND PROPERTY

The CONTRACTOR shall be held alone responsible for all injuries to persons and for all damages to the property of the Himco Site Trust or others, caused by or resulting from the

negligence of himself/herself, his/her employees, agents or Subcontractors during the progress of, or connected with the prosecution of the work, whether within the limit of the work or elsewhere.

The CONTRACTOR must restore all injured property, including sidewalks, curbing, sodding, pipes, conduits, sewer and other public or private property to a condition as good as it was when CONTRACTOR entered upon the Work.

9. NONLIABILITY

The Himco Site Trust shall not be liable for any injuries to the property of CONTRACTOR or any loss or damage sustained by CONTRACTOR caused by or resulting from any activity and/or incidents that are in any way connected with the performance or work or any other matter pursuant to the Contract by CONTRACTOR or any activity and/or incidence that is incidental thereto.

10. INDEMNIFICATION CLAUSE FOR HIMCO SITE TRUST CONTRACTS

CONTRACTOR hereby agrees to indemnify, hold harmless and defend the Himco Site Trust from and against any and all actions or causes of action, claims, demands, liabilities, loss, damage or expense of whatsoever kind and nature, including attorney's fees, which the Himco Site Trust may suffer or incur by reason of bodily injury, including death, to any person or persons, or by reason of damage to or destruction of any property, including the loss thereof, arising out of or in any manner connected with the work to be performed pursuant to the Contract, or which the Himco Site Trust may sustain or incur in connection with any litigation, investigation, or other expenditures incident thereto, including any suit instituted by the Himco Site Trust to enforce the obligation of this agreement of indemnity, whether due in whole to in part to any act, omission or negligence of the Himco Site Trust or any of the Himco Site Trust's representatives or employees and whether it is alleged that the Himco Site Trust, the Himco Site Trust's representatives or employees in any way contributed to the alleged act, omission or negligence and whether it is alleged that the Himco Site Trust is liable to any person or entity by reason of a non-delegable duty. It is the intent of the parties hereto that the CONTRACTOR shall indemnify the Himco Site Trust under this indemnification clause to the fullest extent permitted by law, including indemnity for the sole negligence of the Himco Site Trust. However, the indemnity herein for injury or damage caused by the sole negligence of the Himco Site Trust is found to be contrary to law, it is the intent of the CONTRACTOR and the Himco Site Trust that this agreement of indemnity shall in all other respects be and remain effective and binding on the parties hereto.

11. SANITARY CONVENIENCES: NUISANCES

The CONTRACTOR shall provide all necessary toilet accommodations for the use of his/her employees on the street, and shall not create nor permit any nuisance to the public or to residents in the vicinity of the work.

FIRE HYDRANTS

No materials or other obstructions shall be placed within five feet of fire hydrants, which must be at all times readily accessible to the Fire Department. Hydrant wrenches only shall be used on hydrants. A permit shall be attained at the City of Elkhart Water Works Office for any connection to fire hydrants.

USE OF CITY HYDRANTS

NOTE: USE LIMITED TO CONTRACTORS, OTHER CITY DEPARTMENTS AND TOWNSHIP FIRE DEPARTMENTS. SPECIAL CONSIDERATION WILL BE GIVEN OTHERS ONLY WHEN EXTREME HARDSHIP REQUIRES HYDRANT USE.

1. Obtain permit at Water Works office. Water Works will charge for water used and an inspection fee for checking hydrant after each use. A refundable deposit of \$150 is required to guarantee proper use of hydrant.
2. If you do not have an approved hydrant connection and hydrant wrench, make necessary deposit for same and rent at Water Works office. (Rent \$10/day, plus \$100 refundable deposit).
3. Pick up connection and wrench at North Main Street Pumping Station from the Operator on duty.
4. Hardship Cases: When water cannot be obtained through a normal metered service, and a hydrant is the only water source available, permission to use a hydrant will be granted upon applicant's guarantee to pay any damage caused to the hydrant or from water delivered from the hydrant.
5. Water Department does not supply hose.

PROCEDURE IN USING HYDRANT CONNECTION (NO DEVIATIONS PERMITTED)

1. Remove hydrant cap and install valved hydrant connection.
2. Shut off valve on hydrant connection.
3. Positively never use a pipe wrench on a hydrant. Fire hydrants, when in use, must be wide open at all times. Otherwise, the drains are open and the hydrant may be damaged by water escaping from the drain. This makes the soil soggy and removes the soil support which is necessary to keep the hydrant from separating from the pipe line.
4. Turn on hydrant. Open hydrant valve fully, using approved type of wrench.
5. Regulate flow of water with hydrant connection valve.
6. When finished and ready to shut hydrant off, close connection valve, close hydrant, then open hydrant connection valve and check to see if hydrant is shut off.
7. Remove connection. Check to see that water drains from hydrant barrel. Replace hydrant cap.

8. Return connection and wrench (if rented) and go to Water Works office to pick up refund of deposit for same.
9. After hydrant inspection, Water Works will return guarantee deposit, less any maintenance costs due to misuse of hydrant.

CHARGES: Where amount of water to be used is known, actual cost of water at \$1.60/1,000 gallon will be charged. Otherwise, flat fee of \$15/day will be charged.

ILLEGAL HYDRANT USE: \$200/day or occurrence, plus actual cost to repair any damage.

13. MAINTENANCE AND PROTECTION OF TRAFFIC: BARRICADES, BARRIERS, TRAFFIC SIGNS, LIGHTS, AND WATCHMEN

The CONTRACTOR shall provide and maintain all necessary barricades, warning and information signs, fences, barriers, "Street Closed" signs, lights, flagmen, and watchmen as may be essential to prevent avoidable accidents to residents and to the public. These devices shall meet the approval of the ENGINEER and be in accordance with the most current edition of the Indiana Manual on Uniform Traffic Control Devices for Streets and Highways.

When constructing the signal portion of the Contract the CONTRACTOR shall not restrict traffic flow during the rush-hour periods nor shall barricades be left in the roadway overnight. When the operation of the existing traffic signals must be interrupted or the existing traffic signals are to be removed before the new signals are placed in operation, CONTRACTOR is to arrange and prosecute the work so that such interruption will be limited to a minimum amount of time and is to erect and maintain temporary "STOP" signs at the intersections if required by the ENGINEER.

Prior to working in any portions of the roadway within the limits of the City of Elkhart, the CONTRACTOR shall submit a plan of operations in writing to the ENGINEER and City ENGINEER. If it is anticipated that during the construction period disruptions to the existing signals will occur, then the CONTRACTOR shall submit to the ENGINEER and City ENGINEER a proposed exact implementation procedure to minimize any disruptions.

14. DISORDERLY EMPLOYEES

Disorderly, intemperate or incompetent persons shall not be employed, retained or allowed upon the work. Supervisors or laborers who neglect or refuse to comply with the instructions of the ENGINEER shall not thereafter be re-employed without his/her consent.

15. ORDER AND PROGRESS OF DOING WORK

The work under the Contract shall be executed in such a manner as deemed necessary by the ENGINEER to secure its completion within the Contract time. Completed portions of the pavement shall be opened to travel as directed by the ENGINEER, but such opening shall not be construed as an acceptance by the Himco Site Trust of the work done.

16. MONUMENTS OR STAKES

The CONTRACTOR shall carefully protect from disturbances or injury all monuments, stakes and bench marks. If in the opinion of the ENGINEER, any stakes or monuments have been carelessly or willfully destroyed or disturbed by the CONTRACTOR or his/her employees, the cost of replacing them shall be charged against the CONTRACTOR and shall be deducted from the payments for the work.

17. PUBLIC CONVENIENCE

During the progress of the work, the sidewalks and portions of the street adjoining the work or in its vicinity shall not be obstructed or littered more than may be absolutely necessary and the adjacent sidewalks shall be kept clean. The convenience of the public and of the residents along the street shall be provided for as far as practicable. Convenient access to driveways, houses and buildings along the street shall be maintained wherever possible. Temporary approaches to and crossings of intersecting streets and sidewalks shall be provided and kept in good condition wherever practicable.

18. WAGE RATES

Wage rates on this work shall not be less than the prescribed scale of wages as determined pursuant to the provisions of Chapter 319 of the Acts of the General Assembly of Indiana, 1935, for the type and class of work required to perform the Contract.

19. NONDISCRIMINATION

In compliance with the Acts of the Indiana General Assembly, 1933, Chapter 270, as amended, and currently codified as Ind. Code 5-16-6-1, and the Acts of the Indiana General Assembly, 1961, Chapter 208, as amended, and currently codified as Ind. Code 22-9-1-10, CONTRACTOR hereby agrees:

- A. That in the hiring of employees for the performance of work under the Contract or any subcontract hereunder, no CONTRACTOR, Subcontractor nor any person acting on behalf of such CONTRACTOR, shall by reason of race, age, religion, color, sex, national origin, ancestry, or handicap, discriminate against any person who is qualified and available to perform the work to which the employment relates as defined by law except where specific age, sex or physical requirements constitute a bona fide occupational qualification necessary to proper and efficient operation or as provided by law.
- B. That no CONTRACTOR, Subcontractor, nor any person on the CONTRACTOR's behalf, shall, in any manner, with respect to tenure, terms, conditions or privileges of employment, or any other matter directly or indirectly related to employment, discriminate against or intimidate any employee hired for the performance of work under the Contract on account of race, age, religion, color, sex, national origin, ancestry, or handicap.
- C. That the Contract may be canceled or terminated by the Trust and all money due or to become due hereunder may be forfeited for a violation of the terms of conditions of

this section of the Contract.

20. CONTRACTOR'S INSURANCE

The CONTRACTOR shall not commence work under the Contract until he/she has obtained all insurance required and such insurance has been approved by the Himco Site Trust; nor shall the CONTRACTOR allow any Subcontractor to commence work on his/her subcontract until all similar insurance required of the Subcontractor has been obtained and approved. Such insurance shall be maintained during the life of the Contract.

- A. Workmen's Compensation Insurance to cover any and all of the CONTRACTOR's employees performing work under the Contract at the site of the improvement.
- B. Public Liability Bodily Injury Insurance of not less than five hundred thousand (\$500,000) for injuries, including accidental death, to any one person and subject to the same limit for each person, in an amount of not less than one million dollars (\$1,000,000) on account of one accident.
- C. Public Liability Property Damage Insurance of not less than three hundred thousand dollars (\$300,000).
- D. Automobile Public Liability Bodily Injury of not less than five hundred thousand (\$500,000) each person and not less than one million dollars (\$1,000,000) each occurrence and Automobile Public Liability Property Damage of not less than three hundred thousand (\$300,000) each occurrence.

Failure on the part of the CONTRACTOR to comply with the insurance requirements shall not relieve him/her of the liability thereunder.

The CONTRACTOR shall assume full responsibility for the payment of all Federal Withholding Tax, Social Security and State Unemployment Compensation Taxes for all employees engaged by the CONTRACTOR.

The CONTRACTOR shall furnish the Himco Site Trust with satisfactory proof of carrying the insurance required.

21. PERMITS AND LICENSES

The CONTRACTOR shall procure at his/her own expense, all permits and licenses, pay charges and fees and give all notices necessary and incidental to the due and lawful execution of the work.

22. ADDITIONAL WORK

No bill for extra work shall be allowed unless the work charged for in the bill was ordered in writing by the Himco Site Trust and defined in the order as extra or additional work. The value of such work shall be determined prior to its being ordered by the Himco Site Trust and said value shall be a part of said order.

23. NON-REIMBURSEMENT ITEMS

No reimbursement will be made for dewatering or bypass pumping. All cost incurred by the CONTRACTOR for these activities shall be merged into water main bid items.

No reimbursement will be made for relocating or replacing culvert pipe. All cost incurred by the CONTRACTOR for these items shall be merged into the water main bid items.

No reimbursement will be made for any sewer cleaning or street cleaning. All cleaning required to complete this project must be done by the CONTRACTOR.

No reimbursement will be made for driveway or sidewalk repair or replacement or for sprinkler repair. All cost incurred by the CONTRACTOR for these items shall be merged into other bid items.

24. CONSTRUCTION SITE VIDEO

The CONTRACTOR shall provide the Himco Site Trust a video recording on DVD of the construction site before construction begins and after construction is complete. This video recording, which will become the property of the Himco Site Trust, shall include all areas that could possibly be damaged either directly or indirectly by construction. The project will not be considered complete until after said video is delivered to the Himco Site Trust's office. All cost for this activity shall be merged into other bid items.

25. IOSHA REGULATIONS

The CONTRACTOR shall follow the IOSHA regulations 29 C.F.R. 1926, Subpart P, for trench safety systems. The cost for trench safety systems shall be merged into the pay item of the principal work with which the safety systems are associated.

26. DEDUCTIONS FOR UNCORRECTED WORK

If the Himco Site Trust deems it expedient to correct work injured or not done in accordance with the plans and specifications, the difference in value together with a fair allowance for damage shall be deducted.

27. PAYMENT

Payment shall be in accordance with these specifications, or in accordance with "Project Specifications".

28. SUPERINTENDENCE BY CONTRACTOR

Except where the CONTRACTOR is an individual and gives his/her personal superintendence to the work, the CONTRACTOR shall provide a competent superintendent, satisfactory to the Local Public Agency and the ENGINEER, on the work at all times during

working hours with full authority to act for the CONTRACTOR. The CONTRACTOR shall also provide an adequate staff for the proper coordination and expediting of the work.

The Local Public Agency may require the CONTRACTOR to dismiss from the work such employee or employees as the Local Public Agency or the ENGINEER may deem incompetent, intemperate, careless, or insubordinate.

29. NOTIFICATION OF CHANGES

The Himco Site Trust acknowledges responsibility to advise all plan holders of any changes up to the time of bid opening. We accept no responsibility to notify non-plan holders of any changes.

30. VARIANCES WITH STATE HIGHWAY SPECIFICATIONS

If existing sections or subsequent additions to these specifications vary with the INDIANA STATE HIGHWAY COMMISSION 1993 "STANDARD SPECIFICATIONS", or if variances occur on the plans or are directed by the ENGINEER, said variances shall NOT be construed to invalidate those parts of the section of the State Highway Specifications which are not in variance or conflict and the variances together with the remaining portion of these State Highway Specifications not in conflict, shall constitute the specifications for the structures.

31. COOPERATION WITH PUBLIC AND PRIVATELY OWNED UTILITIES

The CONTRACTOR should especially note the provisions of Section 105.06 of the INDIANA STATE HIGHWAY COMMISSION 1993 STANDARD SPECIFICATIONS. In the event a permit or permits are approved by the City of Elkhart or County for the installation of utility structures, conduits, lines or appurtenances on or in the structure or its approaches, the CONTRACTOR shall cooperate with the Utility Company making such installation, permit entry and allow reasonable time for the completion of the installation, permittee shall not damage or unnecessarily interfere with the CONTRACTOR's work, and shall be required to make suitable arrangements with the CONTRACTOR for all installations. No payment will be made by the Himco Site Trust for any delay or inconvenience caused by such installation. No compensation will be allowed for moving City of Elkhart owned utility appurtenances.

It shall be the responsibility of the CONTRACTOR to determine the location of all overhead utility lines within the project limits and to verify that the proper clearances, as specified by the utility, shall be observed if the signal standards are installed as shown on the plans. Where conflicts occur, the ENGINEER shall determine the solution and his decision shall be final.

The following is a list of the owners of utilities known to be within the limits of construction:

Northern Indiana Public Service
P.O. Box 1355
South Bend, IN 45524

Indiana Michigan Power
23333 U.S. 20
Elkhart, IN 45515

Elkhart Water Works
1201 South Nappanee Street
Elkhart, IN 45516

GTE North Incorporated
129 South Second Street
Elkhart, IN 46515

TCI of Indiana, Inc
1683 Edison Road
Elkhart, IN 45545

AT & T
59221 Hickory Road
South Bend, IN 46514

32. PUBLIC UTILITIES AND PRIVATE STRUCTURES

The CONTRACTOR shall assume all risk and liability for any inconvenience, delay or expense that may be occasioned him/her by Public Utilities or other Public or private property within the limits of the proposed improvement, whether or not such property is shown on the plans and shall do no work which will injure or damage such property until satisfactory arrangements have been completed with the owner for its protection, relocation or reconstruction.

The CONTRACTOR shall give notice to owners of gas pipes, water pipes and conduits in sufficient time for the owners to take means to relocate or to protect their property.

At points where the CONTRACTOR's operations are adjacent to properties of telephone and power companies or are adjacent to other property, damage to which might result in considerable expense to others, loss or inconvenience, work shall not be started until all arrangements necessary for the protection, relocation or reconstruction thereof have been completed.

The CONTRACTOR shall cooperate with the owners of any underground or overhead utility facilities in their removal, relocation or reconstruction operations in order that these operations may progress in a reasonable manner and that duplication of rearrangement may be reduced to a minimum and that services rendered by these parties shall not be unnecessarily interrupted.

In the event of interruption of water utility services as a result of accidental breakage or as a result of being exposed or unsupported, the CONTRACTOR shall immediately notify the proper authority of the affected utility. He/she shall cooperate with the restoration of service as promptly as possible.

33. CONTRACTOR'S RESPONSIBILITY FOR MATCHING OLD WORK

Where new work is to be fitted to old work, the CONTRACTOR shall check all leading dimensions and conditions in the field and report any errors or discrepancies to the ENGINEER or assume responsibility for their correctness and fit of new parts to the old. If such parts do not fit properly the CONTRACTOR shall make and pay for such alterations or new parts as may be necessary to assure proper fits and connections meeting the approval of the ENGINEER.

34. UNDERGROUND SPRINKLING SYSTEMS

Any underground sprinkling systems encountered during the construction of this project shall be the responsibility of the CONTRACTOR and shall be protected or replaced at the CONTRACTOR's expense.

The Himco Site Trust will not be financially responsible for any sprinkling systems which are damaged during construction regardless of whether they are located on private property or city right-of-way.

35. RESPONSIBILITY FOR SETTLEMENT

Any depression which may develop in backfilled areas from settlement within one year after the work is fully completed and accepted shall be the responsibility of the CONTRACTOR. The CONTRACTOR shall provide as needed, at the CONTRACTOR's own expense, additional backfill material, pavement base replacement, permanent pavement, sidewalk, curb and driveway repair or replacement, and lawn replacement and shall perform the necessary reconditioning and restoration work to bring such depressed areas to proper grade as approved.

36. CONSTRUCTION NOISE

All equipment, including but not limited to graders, bulldozers, backhoe, air-hammers, and miscellaneous trucks, shall be kept in good repair meeting or bettering the manufacturers noise level specifications. In addition all IOSHA standards pertaining to construction noise shall be made an integral part of the specification in accordance with IDOT Standard Specifications.

37. WORK PERFORMED BY HIMCO SITE TRUST EMPLOYEES

If the ENGINEER in his/her sole judgement determines that Himco Site Trust employees have been used to perform work that is the CONTRACTOR's responsibility, he/she may charge the CONTRACTOR using the following rates:

Professionals	\$150.00/hr.
Non-Professionals	\$100.00/hr.

The ENGINEER reserves the right to implement this option after the problem is called to the attention of the CONTRACTOR's representative on the project and a satisfactory response, in

his sole judgement, is not received. At that time the ENGINEER is empowered to deduct the charges from the CONTRACTOR's payments.

Examples of CONTRACTOR's responsibilities most frequently neglected to a degree that the ENGINEER feels compelled to intervene, include, but are not limited to:

Traffic Control
Subcontractor/Supplier Coordination
Clean-up and restoration

38. PAYMENT OF PERIODICAL ESTIMATES AND FINAL PAYMENT

Not later than the last calendar day of each month and at the completion of the work under the Contract the CONTRACTOR shall prepare and submit to the Himco Site Trust a detailed estimate on a form supplied by the ENGINEER of the work performed during the period, such estimate to be used after approval by the ENGINEER as a basis for periodical and final payment by the Himco Site Trust to the CONTRACTOR for work performed under the Contract.

The Himco Site Trust will make partial payment to the CONTRACTOR on the basis of duly certified approved estimate for the work performed by the CONTRACTOR during the preceding calendar month. The Himco Site Trust will retain ten percent (10%) of the amount of each such periodical estimate until final completion and acceptance by the Himco Site Trust of all work included in the Contract.

Final payment of ten percent (10%) retained by the Himco Site Trust on the monthly periodical estimates and on the final estimate will be paid to the CONTRACTOR not later than (90) days after final acceptance by the Himco Site Trust of the work on the Contract.

A. The Himco Site Trust Right to Withhold Certain Amounts and Make Application Thereto: The Himco Site Trust may withhold, in addition to retained percentage, from payment to the CONTRACTOR, such an amount or amounts as may be necessary to cover:

1. Payments that may be earned or due for just claims for labor or materials furnished in and about the work.
2. For defective work not remedied.
3. Reasonable doubt that the Contract can be completed for the balance then unpaid.
4. Evidence of damage to another CONTRACTOR.
5. Excess cost of field engineering and inspection as defined herein.

The Himco Site Trust will disburse and shall have the right to act as agent for the CONTRACTOR in disbursing such funds as have been withheld pursuant to this paragraph to the party or parties who are entitled to payment. The Himco Site Trust will render to the CONTRACTOR a proper accounting of all such funds disbursed in behalf of the CONTRACTOR.

The Himco Site Trust also reserves the right even after full completion and acceptance of the work, to refuse payment of the final ten percent (10%) due the CONTRACTOR, until it is satisfied that all Subcontractors, material suppliers, and employees of the CONTRACTOR have been paid in full.

- B. Deduction For Uncorrected Work: If the Himco Site Trust deems it expedient to accept work injured or not done in accordance with the Contract, an equitable adjustment will be made with a proper deduction from the Contract price for unsatisfactory work.

No claim for an addition to the Contract price will be valid unless authorized as mentioned previously.

It shall be expressly understood and hereby agreed to by the CONTRACTOR that no claim for additional work will be recognized by the Himco Site Trust unless the work has been ordered in writing by the Himco Site Trust, and unless claim for such added work has been filed by the CONTRACTOR within five (5) days after the end of the calendar month in which such alleged additional work was performed.

39. APPROXIMATE QUANTITIES

Quantities stated in which unit price bids are invited are approximate only, and to be used as a guide for receiving unit price bids. Payment shall be based on actual number of units installed regardless of discrepancy.

The Himco Site Trust reserves the right to increase or decrease any of these quantities by any amount to fit the scope of the project to the available funding.

40. CONDITIONAL BID

A bidder shall not stipulate any conditions regarding his/her bid other than those contained in the specifications.

If the CONTRACTOR stipulates any conditions in his/her bid, it will give cause for the Himco Site Trust to consider the rejection of the CONTRACTOR's bid.

41. HOUSE CONNECTIONS

- A. Excavation Permit: The CONTRACTOR must have an excavation permit before any work in the City right-of-way commences. The CONTRACTOR shall have an excavation permit even if the site is in the County or if a new street has yet to be dedicated to the City of Elkhart.
- B. Pavement Cuts: The Himco Site Trust, or his duly authorized agents, shall approve all pavement cuts and the location of utilities placed in the right-of-way.

Pavement Excavations: Pavement excavations must have saw cut edges and may have a temporary repair using roto-mill, slag or cold patch for patch, which may be in place for a maximum of four (4) months, unless other arrangements are made and approved

by the ENGINEER.

Pavement Repair: Pavement repair must include matching the existing material depth or seven and one-half (1 1/2) inches for asphalt or six (6) inches for concrete, whichever is greater, for residential streets. The surface material for pavement repair must be the same as the existing surface material or approved equal.

42. CROSS CONNECTIONS

The objectives of this rule, approved by the local Water Board on March 25, 1982 are as follows:

1. To provide for the protection of the municipality's potable water distribution system from contamination, or the potential of contamination, by isolating within its customer's private systems any contaminants or pollutants which otherwise could, under adverse conditions, backflow through cross connections into the public water distribution system.
2. Provide for the installation and maintenance of cross connection controls which will systematically and efficiently prevent or contain all existing or potential backflow from customer's systems into the public water supply system.

In order for the Utility to provide the above, the CONTRACTOR shall grant to the Utility, upon request, the right to enter the premises to make inspections of piping. The Utility will report any violations, as set out in "1" and "2" above, to both the CONTRACTOR and the respective authority. The Utility will not assume responsibility for damage, sickness or death arising from the existence of an improper cross connection or the use or failure of a cross connection prevention device. Failure to correct a non-complying installation will lead to a disconnection of service.

The policy on cross connections sets forth in detail the rules necessary to protect the purity of the water supply from contamination introduced through cross connections.

43. PROTECTION OF PUBLIC

The CONTRACTOR will be required to barricade and maintain sufficient flares during construction, on any or all of the work as may be necessary for the protection of the public as well as the City's, County's, or States interest.

44. DEWATERING

Any costs incurred due to dewatering shall be the responsibility of the CONTRACTOR. All costs for dewatering shall be incidental to all projects unless other specified by the Himco Site Trust or approved representative. All dewatering shall not interfere with the normal traffic of any streets or residents unless approved by the Himco Site Trust or approved representative.

45.

RECORD DRAWINGS

All CONTRACTOR's shall supply the Himco Site Trust with 2 sets of record drawings before final payment will ever be made. These drawings shall consist of all location in the field with the following requirements:

WATER

1. Main valve measurements from centerline of streets.
2. Location of valve and end of main (for future stubs).
3. Service measurements from property lines and centerline of street.
4. Service size, material and approximate depth.
5. Hydrant location with approximate spacing. (The location of the hydrant shall be determined by 2 known points as depicted on the drawings).
6. Make and model of hydrant.
7. Note and locate any elbows, tees and crosses not indicated on original design.
8. Note and locate any changes on original design.

END OF SECTION



SPECIAL PROVISIONS

1. PROJECT SIGNBOARDS

Project signboards are not required for this project.

2. TESTING

The ENGINEER will retain and coordinate the services of testing companies necessary to complete geotechnical, compaction and water quality testing.

3. TEMPORARY FACILITIES AND CONTROLS

CONTRACTOR will provide to site all necessary materials, equipment and labor to construct and maintain temporary facilities and controls as required for the construction of water main and appurtenances by the methods employed. Facilities and controls will include dewatering, decanting and discharge of flows; drainage and siltation control; and all other facilities deemed necessary by the CONTRACTOR.

The CONTRACTOR will prepare Traffic Control Plans for the work in the subdivision and also for the work on West Bristol Street to the requirements of the Indiana Manual of Uniform Traffic Control Devices and submit them to the ENGINEER for review prior to commencement of related construction.

4. WATER MAIN

The price per foot of water main includes removals; excavation; bedding; pipe; temporary services required for testing and disinfection; backfill; compaction; and restoration to existing condition.

Backfilling of trenches will not lag more than 50 feet behind the pipe laying operation.

Subsequent to final connections being made, all temporary services used for testing will have the main cock removed and replaced with an iron plug.

5. WATER SERVICE LATERALS

All service laterals crossing existing paved roads will be installed by trenchless methods to avoid disruption to pavement and the need for asphalt patching.

Additional services may be requested by property owners outside the regulated servicing area (i.e. Westwood Drive from Northwood Drive to Highland Blvd). The price for service laterals will apply to the installation of additional laterals requested during the construction period.

6. WORK ON WEST BRISTOL STREET

The CONTRACTOR will obtain the necessary roadwork permit from the State highway department prior to commencing any activity on West Bristol Street.

A minimum of one lane of traffic in each direction will be maintained on West Bristol Street at all times.

Two days of lane closure are available for preparation of the road for construction, including saw cutting of the concrete surface.

Two days of lane closure are available for the installation of water main across the intersection to the location of the existing main. Temporary restoration may be compacted gravel with proper maintenance.

One day of lane closure is available for final connection of the new main to the existing main. Temporary restoration may be compacted gravel with proper maintenance.

Six days of lane closure is available for restoration of the concrete surface, completed one half the road width at a time. The concrete will be given two days of curing time prior to opening the surface to traffic.

When possible, lanes will not be restricted during heavy traffic periods between the hours of 7:30 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. weekdays. Any night and weekend work may be subject to acquisition of a Noise By-Law Exemption by the CONTRACTOR.

7. FITTINGS

The price for fittings include excavation; bedding; the fitting and associated hardware; bond breaker; thrust block or restraining hardware; backfill; compaction; and restoration. The CONTRACTOR will provide for review supporting calculations for all thrust restraining fittings proposed to be used.

8. FINAL CONNECTIONS

Final connections to the existing large diameter water mains on John Weaver Parkway and West Bristol Street will be made after the successful disinfection of the new mains and without shutting down existing mains by using a tapping sleeve and valve at each location. The City of Elkhart will undertake tapping of the existing pipelines by their own forces. All coordination and preparation for this tapping work will be completed by the CONTRACTOR in order to minimize the time required to work in the intersection.

9. SERVICES ON PRIVATE PROPERTY

The price for service construction and connection, on private property includes coordination with the property owner to schedule the work; construction of service line from the service box to the existing well or point of entry to the building; connection to existing piping with adapters as necessary; excavation under the floor and penetration into the building where necessary; removal of the existing well pump and pressure tank; connection to existing

pipng; installation of a new water meter and remote readout; modification of existing plumbing to reinstate proper flow and to prevent cross connection to a non-municipal source; abandonment of the existing well; and restoration of yard and building to original condition; all for each particular unit.

Service connections will be made to minimize the amount of time a property is without water supply. A maximum of 8 hours will be allowed before provision of an alternate source of potable water by the Contractor. After the new connection and plumbing modifications are made, all piping will be inspected for leaks and proper flow.

The CONTRACTOR will obtain water meters and remote readouts from the municipality. Backflow preventers are not required on residential water services. Existing well pumps and pressure tanks will remain on the property or disposed by the CONTRACTOR as preferred by the property owner.

The existing well on each property will be abandoned by a properly qualified and licensed well driller in accordance with Indiana Administrative Code, Rule 10, 312 IAC 13-10-2 Permanent Abandonment of Wells.

Restoration of each property will include asphalt and concrete surfaces as necessary; topsoil, seed and mulch; garden areas and plantings; and all building materials disrupted during the exterior and interior installation of the service and plumbing modification works.

END OF SECTION

SPECIAL PROVISIONS

1. PROJECT SIGNBOARDS

Project signboards are not required for this project.

2. TESTING

The ENGINEER will retain and coordinate the services of testing companies necessary to complete geotechnical, compaction and water quality testing.

3. TEMPORARY FACILITIES AND CONTROLS

CONTRACTOR will provide to site all necessary materials, equipment and labor to construct and maintain temporary facilities and controls as required for the construction of water main and appurtenances by the methods employed. Facilities and controls will include dewatering, decanting and discharge of flows; drainage and siltation control; and all other facilities deemed necessary by the CONTRACTOR.

The CONTRACTOR will prepare Traffic Control Plans for the work in the subdivision and also for the work on West Bristol Street to the requirements of the Indiana Manual of Uniform Traffic Control Devices and submit them to the ENGINEER for review prior to commencement of related construction.

4. WATER MAIN

The price per foot of water main includes removals; excavation; bedding; pipe; temporary services required for testing and disinfection; backfill; compaction; and restoration to existing condition.

Backfilling of trenches will not lag more than 50 feet behind the pipe laying operation.

Subsequent to final connections being made, all temporary services used for testing will have the main cock removed and replaced with an iron plug.

5. WATER SERVICE LATERALS

All service laterals crossing existing paved roads will be installed by trenchless methods to avoid disruption to pavement and the need for asphalt patching.

Additional services may be requested by property owners outside the regulated servicing area (i.e. Westwood Drive from Northwood Drive to Highland Blvd). The price for service laterals will apply to the installation of additional laterals requested during the construction period.

6. WORK ON WEST BRISTOL STREET

The CONTRACTOR will obtain the necessary roadwork permit from the State highway department prior to commencing any activity on West Bristol Street.

A minimum of one lane of traffic in each direction will be maintained on West Bristol Street at all times.

Two days of lane closure are available for preparation of the road for construction, including saw cutting of the concrete surface.

Two days of lane closure are available for the installation of water main across the intersection to the location of the existing main. Temporary restoration may be compacted gravel with proper maintenance.

One day of lane closure is available for final connection of the new main to the existing main. Temporary restoration may be compacted gravel with proper maintenance.

Six days of lane closure is available for restoration of the concrete surface, completed one half the road width at a time. The concrete will be given two days of curing time prior to opening the surface to traffic.

When possible, lanes will not be restricted during heavy traffic periods between the hours of 7:30 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. weekdays. Any night and weekend work may be subject to acquisition of a Noise By-Law Exemption by the CONTRACTOR.

7. FITTINGS

The price for fittings include excavation; bedding; the fitting and associated hardware; bond breaker; thrust block or restraining hardware; backfill; compaction; and restoration. The CONTRACTOR will provide for review supporting calculations for all thrust restraining fittings proposed to be used.

8. FINAL CONNECTIONS

Final connections to the existing large diameter water mains on John Weaver Parkway and West Bristol Street will be made after the successful disinfection of the new mains and without shutting down existing mains by using a tapping sleeve and valve at each location. The City of Elkhart will undertake tapping of the existing pipelines by their own forces. All coordination and preparation for this tapping work will be completed by the CONTRACTOR in order to minimize the time required to work in the intersection.

9. SERVICES ON PRIVATE PROPERTY

The price for service construction and connection, on private property includes coordination with the property owner to schedule the work; construction of service line from the service box to the existing well or point of entry to the building; connection to existing piping with adapters as necessary; excavation under the floor and penetration into the building where necessary; removal of the existing well pump and pressure tank; connection to existing

pipng; installation of a new water meter and remote readout; modification of existing plumbing to reinstate proper flow and to prevent cross connection to a non-municipal source; abandonment of the existing well; and restoration of yard and building to original condition; all for each particular unit.

Service connections will be made to minimize the amount of time a property is without water supply. A maximum of 8 hours will be allowed before provision of an alternate source of potable water by the Contractor. After the new connection and plumbing modifications are made, all piping will be inspected for leaks and proper flow.

The CONTRACTOR will obtain water meters and remote readouts from the municipality. Backflow preventers are not required on residential water services. Existing well pumps and pressure tanks will remain on the property or disposed by the CONTRACTOR as preferred by the property owner.

The existing well on each property will be abandoned by a properly qualified and licensed well driller in accordance with Indiana Administrative Code, Rule 10, 312 IAC 13-10-2 Permanent Abandonment of Wells.

Restoration of each property will include asphalt and concrete surfaces as necessary; topsoil, seed and mulch; garden areas and plantings; and all building materials disrupted during the exterior and interior installation of the service and plumbing modification works.

END OF SECTION

CONSTRUCTION SPECIFICATIONS

PART 1 SITE PREPARATION

1.1 SURVEYING

- A. Description: All work under the Contract shall be constructed in accordance with the lines and grades shown on the Plans, or as given by the ENGINEER. The full responsibility for keeping alignment and grade shall rest upon the CONTRACTOR.

The ENGINEER will establish bench marks and base line controlling points. It shall be the CONTRACTOR's responsibility to set line and grade using the above mentioned reference marks. The CONTRACTOR shall place excavation and other materials so as to cause no inconvenience in the use of the reference marks. The CONTRACTOR shall remove any obstructions placed by him/her contrary to this provision.

- B. Survey: The CONTRACTOR shall furnish and maintain, at his/her own expense, stakes and other such materials, and give such assistance, including qualified helpers, as may be required by the ENGINEER for checking line and grade marks set by the CONTRACTOR. The CONTRACTOR shall check such reference marks by such means as he/she may deem necessary and, before using them shall call the ENGINEER's attention to any inaccuracies. The CONTRACTOR shall, at no additional cost to the Himco Site Trust, establish all working or construction lines and grades as required from the reference marks set by the ENGINEER, and shall be solely responsible for the accuracy thereof. The CONTRACTOR shall, however, be subject to the check and review of the ENGINEER.

It is the intention not to delay the work for the establishment of reference marks and the checking of lines and grades set by the CONTRACTOR, but, when necessary, working operations shall be suspended for such reasonable time as the ENGINEER may require for this purpose.

The CONTRACTOR shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes and marks.

The CONTRACTOR shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.

- C. Method of Measurement: Surveying shall be considered on a lump sum line item.
- D. Basis of Payment: The lump sum price will be paid and shall be full compensation for the estimated quantities shown in the contract.

1.2 CLEARING AND GRUBBING RIGHT-OF-WAY

- A. Description: This work shall consist of clearing, grubbing, removing, and disposing of all vegetation and debris within the limits of the right-of-way and easement areas. Burning will not be allowed.

- B. General: Right-of-Way lines and construction lines will be established, and trees, shrubs, plants, and other things to be removed will be designated. All other items shall be preserved. Any damage to natural terrain or to vegetation or objects designated to remain shall be repaired, replaced, or otherwise compensated for; as determined, with no additional payment. All natural terrain and vegetation that is to be removed shall also be approved by the Himco Site Trust or authorized representative.
- C. Clearing and Grubbing: This item shall be in accordance with Section 201.03 in the INDIANA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATION, 1995.
- D. Method of Measurement: Clearing and grubbing shall be considered on a lump sum line item.
- E. Basis of Payment: The lump sum price will be paid and shall be full compensation for the estimated quantities shown in the contract.

1.3 EXCAVATION

- A. Description: This work shall consist of excavation, hauling, and disposal or compaction of all material left on the job site. The limits of the work shall not go beyond the right-of-way limits unless otherwise stated by the ENGINEER.
- B. Dry Trench: The pipe shall be laid in a dry trench. If groundwater is encountered, the CONTRACTOR shall make provisions to dewater and dry up the trench at his/her own expense, at no additional cost to the Himco Site Trust. It is the CONTRACTOR's responsibility to inspect the proposed site prior to the submission of his/her bid, and determine for himself/herself whether groundwater is to be encountered. The Himco Site Trust will not be responsible for any assumption made concerning groundwater.
- C. Method of Measurement: This item will be measured by the cubic yard.
- D. Basis of Payment: This item is considered incidental to the contract, unless otherwise stated by the ENGINEER.

1.4 TEMPORARY FACILITIES AND CONTROLS

- A. Section Includes:
 - 1. Temporary Utilities: Electricity, construction lighting, fire protection.
 - 2. Construction Facilities: Field office, storage/stockpiling facilities.
 - 3. Vehicular Access and Parking: traffic regulation.
 - 4. Temporary Barriers and Enclosures: Barriers, security.
 - 5. Temporary Controls: Water control, erosion and sediment control, noise control, dust and particulate emission control, and pollution control.
 - 6. Removal of temporary facilities and controls.

B Temporary Utilities:

1. Electricity:

Provide, maintain, and pay for electrical power service required for the Works.

Route temporary utility lines along alignments approved by CRA. Take necessary precautions to prevent service interruptions due to accidental breakage of utility lines. Coordinate installation with local utility company and comply with Laws and Regulations and the National Electric Code.

2. Fire Protection:

Take precautions to prevent fires. Provide and maintain temporary fire protection equipment of a type appropriate to the hazard anticipated in accordance with authorities having jurisdiction, governing codes, regulations, by-laws and to the satisfaction of CRA and insurance authorities.

Bulk storage of flammable liquids and other hazardous materials is not allowed on the Site. Flammable liquids shall be handled in approved containers.

Open burning of rubbish is not permitted on the Site.

The bringing in, use, and disposal of flammable materials shall be handled as required by authorities having jurisdiction.

Provide fire extinguishers of the non-freezing chemical type in each temporary building, enclosure and trailer.

Use fireproofed tarpaulins.

C. Construction Facilities:

1. ENGINEER's Office Trailer:

Provide, for sole use of CRA, a fully furnished and complete office trailer with minimum floor area of 100 sq ft.

Provide office at time of mobilization to the Site.

Locate office in location as directed by CRA.

Remove office upon final acceptance or when directed by CRA. CRA's office trailer and furnishings remain property of VENDOR.

Maintain office and services continuously. Clean minimum once per week. Provide soap, paper towels, cleansers, janitorial service and implements.

2. Sanitary Facilities:

Provide and maintain required temporary sanitary facilities and enclosures in accordance with OSHA.

Remove and dispose of sanitary wastes off the Site on a periodic basis as required and in accordance with applicable Laws and Regulations.

3. Storage/Stockpiling Facilities: Provide, maintain, and operate materials storage/stockpiling facilities.

D. Vehicular Access:

1. Traffic Regulation:

Signs, Signals, and Devices:

Automatic Traffic Control Signals: As approved by local jurisdictions.

Traffic Cones and Drums, Flares, and Lights: As approved by local jurisdictions.

Flagpersons Equipment: As required by local jurisdictions.

Control construction vehicular parking to prevent interference with public traffic, parking, and access by emergency vehicles.

Monitor parking of construction personnel's vehicles. Maintain vehicular access to and through parking areas.

Prevent construction parking on or adjacent to access roads or in non-designated areas.

Provide trained and equipped flagpersons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

Provide signs, barricades, gatepersons, and other measures required to control traffic on the Site.

Use flares and lights during hours of low visibility to delineate traffic lanes and to guide traffic.

At approaches to the Site and on the Site, install traffic signs and signals at crossroads, detours, parking areas, and elsewhere as needed to direct construction and affected public traffic.

Relocate signs, signals, and devices as work progresses, to maintain effective traffic control.

Remove equipment and devices when no longer required.

Repair damage caused by installation and removal.

2. Street Cleaning: Clean the public roads adjacent to the Site using wet sweeper to remove material tracked from the Site, at least once per week or more frequently as determined by CRA.

E. Temporary Barriers and Enclosures:

1. Barriers:

Provide barriers to prevent unauthorized entry to construction areas. Barricades shall meet the requirements of applicable Laws and Regulations and ENGINEER's approval.

Provide protection for plant life designated to remain. Replace damaged plant life.

Protect vehicular traffic, stored materials, the Site, and structures from damage.

2. Security:

Provide security and facilities to protect the Works and the Site from unauthorized entry, vandalism, and theft.

Initiate security program at time of mobilization to the Site.

Maintain security program throughout construction period until demobilization from the Site.

Photographs taken except by prior written approval of ENGINEER.

If unauthorized personnel are observed on the Site, notify CRA and, if so directed by ENGINEER, call upon the appropriate law enforcement officials for proper legal actions.

F. Temporary Controls:

1. Water Control:

Provide, operate, and maintain necessary equipment appropriately sized to keep excavations and work areas free from water.

Maintain existing surface water runoff patterns at the Site.

Prevent surface water runoff from entering excavations.

Contain water from stockpiled materials.

Have on hand sufficient pumping equipment, machinery, and tankage in good working condition for ordinary emergencies, including power outage, and competent workers for the operation of the pumping equipment.

Contain and collect water and remove silt and sediment prior to discharging to existing natural drainage point. Provide all necessary facilities for sediment removal. Discharge at rate suitable to receiving point to avoid overflow, flooding and/ or erosion.

2. Dewatering:

Dewater the various parts of the Works including, without limitation, open excavations and work areas.

Employ construction methods, plant, procedures, and precautions that will ensure the Works, including excavations, are stable, free from disturbance, and dry.

Dewatering Methods: Includes surface or free water control systems employing ditches, diversions, drains, pipes and/or pumps; and any other measures necessary to enable the whole of the Works to be carried out in the dry.

Provide sufficient and appropriate labor, plant, and equipment necessary to keep the Works free of water including standby equipment necessary to ensure continuous operation of dewatering system.

Take precautions necessary to prevent uplift of any structure or pipeline and protect excavations from flooding and damage due to surface runoff.

3. Noise Control:

Provide methods, means, and facilities to minimize noise produced by construction operations.

Implement and maintain noise control measures during construction in accordance with local regulations.

If machinery, motors, pumps, and other similar equipment must be operated beyond normal working hours, keep the noise below a level acceptable to ENGINEER and relevant authorities by housing the equipment as necessary.

Provide and use sufficient muffling devices that will minimize vehicle and equipment noise levels in the construction area.

4. Dust and Particulate Emission Control:

Execute the Works by methods to minimize raising dust from construction operations.

Implement and maintain dust and particulate control measures during construction in accordance with the local regulations.

Provide positive means to prevent airborne dust from dispersing into atmosphere. Use potable water for a water misting system for dust and particulate control and other methods as approved by ENGINEER.

As a minimum, use appropriate covers on trucks hauling fine or dusty material and use watertight vehicles to haul wet materials.

Prevent dust from becoming a nuisance to adjacent property OWNERS or occupants.

ENGINEER may stop work at any time when CONTRACTOR's control of dusts and particulates is inadequate for the wind conditions present at the Site, or when the air quality monitoring indicates that the release of fugitive dusts and particulates into the atmosphere equals or exceeds acceptable levels to the ENGINEER.

In the event that CONTRACTOR's dust and particulate control is not sufficient for controlling emission of dusts and particulates into the atmosphere, work shall be

discontinued and a meeting held between ENGINEER and CONTRACTOR's to discuss the procedures that VENDOR proposes to resolve the problem. Make all necessary changes to operations prior to resuming any handling of debris, excavation, material handling, processing, or any other work that may cause a release of dusts or particulates.

5. Pollution Control:

Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious toxic substances and pollutants produced by construction operations.

Be prepared to intercept, clean up, and dispose of spills or releases that may occur whether on land or water. Maintain materials and equipment required for cleanup of spills or releases readily accessible on the Site.

Promptly report spills and releases potentially causing damage to the environment to:

ENGINEER.

OWNER.

Authority having jurisdiction or an interest in the spill or release including any conservation authority, water supply authorities, drainage authority, road authority, fire department, etc.

The OWNER of the pollutant, if known.

The person having control over the pollutant, if known.

Contact the manufacturer of the pollutant if known and ascertain the hazards involved, precautions required, and best measures to be used in any cleanup or mitigating action.

Take immediate action using available resources to contain and mitigate the effects on the environment and persons from any spill or release.

No later than 7 days after the date of the Notice to Proceed, develop and submit to CRA a contingency plan for control and clean-up of spills. Contingency plan shall include:

Names and telephone numbers of persons to be notified forthwith of a reportable spill.

Names and telephone numbers of representatives of fire, police, and health departments of local authorities who are responsible to respond to emergency situation.

Names and telephone numbers of companies experienced in control and cleanup of hazardous materials that would be called upon in emergency involving spill.

Proposal for immediate containment and control of spill, clean up procedures to be initiated immediately and any other action to be taken to mitigate potential environmental damage while awaiting additional assistance.

Be responsible for preparing, implementing, directing and supervision of contingency plan.

Equipment Fuelling, Maintenance and Storage:

Obtain ENGINEER's acceptance of refueling areas.

Prior to starting the Works, submit to CRA procedures for interception and rapid clean-up and disposal of fuel spillage.

Ensure that materials required for cleanup of fuel spillages are readily accessible on Site at all times.

Carry out refueling of equipment at acceptable refueling areas.

Ensure that water used for cleaning of equipment does not drain into streams or watercourses. Do not empty fuel, lubricants and/or pesticides into any watercourse, or on ground.

Clean construction equipment prior to entering public roadways to prevent littering. Debris from cleaning equipment shall not be permitted into streams or watercourses.

Store equipment and materials in orderly manner and in location acceptable to ENGINEER.

G. Removal of Temporary Facilities and Controls:

Remove temporary utilities, equipment, facilities, and materials when no longer required.

Remove underground installations.

Clean and repair damage caused by installation or use of temporary work, including hydroseeding of all disturbed areas.

PART 2 SANITARY AND STORM SEWER CONSTRUCTION

2.1 POLYVINYL CHLORIDE (PVC) PIPE

- A. Description: For furnishing and installing complete and in place polyvinyl chloride pipe (ASTM SDR35) for the sanitary sewer. The bid price shall include, but will not be limited to, all cost for labor, materials, tools, equipment, backfill material, backfilling, excavation, compaction. The pipe shall conform to ASTM Designation D3034 (minimum SDR rating of 35) with bell and spigot joints.

All PVC sewer joint shall be water tight and meet the requirements of ASTM Designation D3212. Installation of the pipe shall conform to ASTM designation D2321.

- B. General Requirements: The pipe and fittings shall be a homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties.

- C. Fittings: PVC fittings shall meet the requirements of ASTM Designation D3034. The connections shall be manufactured to accept 6 inch PVC pipe as specified in these specifications. The location of these "TEE" connectors will be determined by the ENGINEER in the field.
- D. Backfilling: The CONTRACTOR shall not backfill sewers above the top of the pipe until the sewer elevations, gradient, alignment and the pipe joints have been installed correctly. The ENGINEER or his authorized agent shall retain the capacity to check, inspect, and approve all sewer elevations, gradient, alignment, and pipe joints at any time during construction.

All sewer pipe laid shall have the space between the pipe and the bottom and sides of the trench backfilled as fast as placed to a point six (6) inches above the top of the pipe. The backfill material to this point should be #'s 8 thru 11 crushed stone or approved equal. The backfill material should be placed with care under the lower haunch area of the pipe and compacted. Place additional material to the spring line of the pipe and compact haunching material to a minimum of 90% Standard Proctor Density. Take precautions to prevent movement of the pipe during placing of material under the pipe haunch. Place initial backfill material in two stages; one to the top of the pipe and the other to a point 6 inches over the top of the pipe. Use hand or mechanical tamping to achieve a minimum of 90% Standard Proctor Density.

The remainder of the trench shall be backfilled by using the material originally excavated from the ditch (except for conditions herein defined or as ordered by the ENGINEER), to a height slightly above the original elevation of the ground. Backfilling shall not be left unfinished more than 400 feet behind the completed masonry or pipe work.

No heavy rock shall be dropped into the trench nor placed within three (3) feet of the sewer pipe. In depositing rock in the trench, care must be taken that the rock does not injure the structure. All spaces between pieces of rock shall be filled with earth to insure there being no voids.

Backfilling from six (6") inches above the top of the pipe to final grade shall be made in lifts not exceeding two (2) feet depth, and shall meet the compaction requirements in Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

After backfilling the CONTRACTOR shall perform an approved mandrel test on the PVC pipe. Deflection test shall be performed after the final backfill has been in place at least 30 days. No pipe shall exceed a vertical deflection of five (5) percent. Deflection test results shall be submitted with the infiltration/exfiltration test results, and they shall be submitted within (3) months of completion of the sewer construction.

- E. Method of Measurement: The footage of pipe to be paid for will be based on the total length of pipe used. When the pipe connects to manholes, inlets, or catch basins, the sections will be measured to the outside face of the structure.
- F. Basis of Payment: The accepted quantities of pipe will be paid for at the contract unit price per linear foot.
- G. Testing: See Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

2.2 POLYVINYL CHLORIDE (PVC) FLEXIBLE PIPE

- A. Description: For furnishing and installing complete and in place polyvinyl chloride flexible pipe for the sanitary sewer. The bid price shall include, but will not be limited to, all cost for labor,

materials, tools, equipment, backfill material, backfilling, excavation, compaction. The pipe shall conform to ASTM Designation D3034 (minimum SDR rating of 26) or ASTM Designation F949 with bell and spigot joints. All PVC joint shall be gasketed. Gaskets shall meet the requirements of ASTM Designation F477.

All PVC sewer joint shall be water tight and meet the requirements of ASTM Designation D3212. Installation of the pipe shall conform to ASTM Designation D2321.

- B. General Requirements: The pipe and fittings shall be homogeneous throughout and free from visible cracks, holes, foreign inclusions, or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties.
- C. Fittings: PVC fittings shall meet the requirements of ASTM Designation D3034 or ASTM F949.
- D. Backfilling: The CONTRACTOR shall not backfill sewers above the top of the pipe until the sewer elevations, gradient, alignment and the pipe joints have been installed correctly. The ENGINEER or his authorized agent shall retain the capacity to check, inspect, and approve all sewer elevations, gradient, alignment, and pipe joints at any time during construction.

All sewer pipe laid shall have the space between the pipe and the bottom and sides of the trench backfilled as fast as placed to a point six (6) inches above the top of the pipe. The backfill material to this point should be #'s 8 thru 11 crushed stone or approved equal. The backfill material should be placed with care under the lower haunch area of the pipe and compacted. Place additional material to the spring line of the pipe and compact haunching material to a minimum of 90% Standard Proctor Density. Take precautions to prevent movement of the pipe during placing of material under the pipe haunch. Place initial backfill material in two stages; one to the top of the pipe and the other to a point 6 inches over the top of the pipe. Use hand or mechanical tamping to achieve a minimum of 90% Standard Proctor Density.

The remainder of the trench shall be backfilled by using the material originally excavated from the ditch (except for conditions herein defined or as ordered by the ENGINEER), to a height slightly above the original elevation of the ground. Backfilling shall not be left unfinished more than 400 feet behind the completed masonry or pipe work.

No heavy rock shall be dropped into the trench nor placed within three (3) feet of the sewer pipe. In depositing rock in the trench, care must be taken that the rock does not injure the structure. All spaces between pieces of rock shall be filled with earth to insure there being no voids.

Backfilling from six (6") inches above the top of the pipe to final grade shall be made in lifts not exceeding two (2) feet depth, and shall meet the compaction requirements in Section 01000 of the 1997 City of Elkhart Standard Construction Specifications.

After backfilling the CONTRACTOR shall perform an approved mandrel test on the PVC pipe. Deflection test shall be performed after the final backfill has been in place at least 30 days. No pipe shall exceed a vertical deflection of five (5) percent. Deflection test results shall be submitted with the infiltration/exfiltration test results, and they shall be submitted within (3) months of completion of the sewer construction.

- E. Method of Measurement: The footage of pipe to be paid for will be based on the total length of pipe used. When the pipe connects to manholes, inlets, or catch basins, the sections will be measured to the outside face of the structure.

- F. Basis of Payment: The accepted quantities of pipe will be paid for at the contract unit price per linear foot.
- G. Testing: See Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

2.3 POLYVINYL CHLORIDE (PVC) SEMI-RIGID COMPOSITE PIPE

- A. Description: For furnishing and installing complete and in place polyvinyl chloride semi-rigid pipe for sanitary sewer. The bid price shall include, but will not be limited to, all cost for labor, materials, tools, equipment, backfill material, backfilling, excavation, and compaction. The pipe shall conform to ASTM Designation D2680 with bell and spigot joints. All PVC sewer joints shall be gasketed. Gaskets shall meet the requirements of ASTM Designation F477. All PVC sewer joints shall be water tight and meet the requirements of ASTM Designation D3212. Installation of the pipe shall conform to ASTM Designation D2321 with notable exceptions ASTM Designation D2680 Appendix.
- B. General Requirements: The pipe and fittings shall be homogeneous throughout and free from cracks, holes, foreign inclusions, or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties.
- C. Fittings: PVC fittings shall meet the requirements of ASTM Designation D2680.
- D. Backfilling: The CONTRACTOR shall not backfill sewers above the top of the pipe until the sewer elevations, gradient, alignment and the pipe joints have been installed correctly. The ENGINEER or his duly authorized agent shall retain the capacity to check, inspect, and approve all sewer elevations, gradient, alignment, and pipe joints at any time during construction.

All sewer pipe as soon as laid shall have the space between the pipe and the bottom and sides of the trench packed full by hand and thoroughly tamped and compacted with a shovel or light tamper, as fast as placed, in lifts not to exceed four (4) inches up to a depth of at least eight (8) inches above the top of the pipe. The filling shall be carried up evenly on both sides. Care shall be taken that no rock, frozen material, or other hard substances are placed in contact with the pipe.

Material for backfilling the space between the pipe and the bottom and sides of the trench and for covering to a depth of two (2) feet, shall be clean dry earth, free from stones larger than two (2) inches, frozen material or other hard substances (except for conditions hereinafter defined).

The remainder of the trench shall be backfilled by using the material originally excavated from the ditch (except for conditions hereinafter defined), to a height slightly above the original elevation of the ground. Backfilling shall not be left unfinished for more than 400 feet behind the completed masonry or pipe work.

No heavy rock shall be dropped into the trench nor placed within three (3) feet of the sewer pipe. In depositing rock in the trench care must be taken that the rock does not injure the structure. All spaces between pieces of rock shall be filled with earth to insure there being no voids.

Backfilling from eight (8) inches above the top of the pipe to final grade shall be made in lifts not exceeding two (2) feet depth, and shall meet the compaction requirements in Section 01000 of the 1997 City of Elkhart standard Construction Specifications.

All backfill material shall be "B" borrow or better or shall be approved by the ENGINEER.

- E. Method of Measurement: The footage of pipe to be paid for will be based on the total length of pipe used. When the pipe connects to manholes, inlets, or catch basins, the sections will be measured to the outside face of the structure.
- F. Basis of Payment: The accepted quantities of pipe will be paid for at the contract unit price per linear foot.
- G. Testing: See Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

2.4 DUCTILE IRON PIPE (D.I.P.)

- A. Description: For furnishing and installing complete and in place ductile iron pipe. The bid price shall include, but will not be limited to, all cost for labor, materials, tools, equipment, backfill material, backfilling, excavation, and compaction.
- B. General Requirements: The ductile iron pipe and fittings shall conform to ANSI/AWWA C151/A21.51—91, ANSI/AWWA C111/A21.11-85 and ANSI/AWWA C150/A21.50-91.
- C. Fittings: For furnishing and installing complete and in place flanged fittings. The bid price shall include, but will not be limited to, all cost for labor, materials, tools, equipment, backfill material, backfilling, excavation, and compaction.
- D. Backfilling: The CONTRACTOR shall not backfill sewers above the top of the pipe until the sewer elevations, gradient, alignment and the pipe joints have been installed correctly. The ENGINEER or his duly authorized agent shall retain the capacity to check, inspect, and approve all sewer elevations, gradient, alignment, and pipe joints at any time during construction.

All sewer pipe as soon as laid shall have the space between the pipe and the bottom and sides of the trench packed full by hand and thoroughly tamped and compacted with a shovel or light tamper, as fast as placed, in lifts not to exceed four (4) inches up to a depth of at least eight (8) inches above the top of the pipe. The filling shall be carried up evenly on both sides. Care shall be taken that no rock, frozen material, or other hard substances are placed in contact with the pipe.

Material for backfilling the space between the pipe and the bottom and sides of the trench and for covering to a depth of two (2) feet, shall be clean dry earth, free from stones larger than two (2) inches, frozen material or other hard substances (except for conditions hereinafter defined).

The remainder of the trench shall be backfilled by using the material originally excavated from the ditch (except for conditions hereinafter defined), to a height slightly above the original elevation of the ground. Backfilling shall not be left unfinished for more than 400 feet behind the completed masonry or pipe work.

No heavy rock shall be dropped into the trench nor placed within three (3) feet of the sewer pipe. In depositing rock in the trench care must be taken that the rock does not injure the structure. All spaces between pieces of rock shall be filled with earth to insure there being no voids.

Backfilling from eight (8) inches above the top of the pipe to final grade shall be made in lifts not exceeding two (2) feet depth, and shall meet the compaction requirements in Section 01000 of the 1997 City of Elkhart Standard Construction Specifications.

All backfill material shall be "B" borrow or better or shall be approved by the ENGINEER.

- E. Method of Measurement: The footage of pipe to be paid for will be based on the total length of pipe used. When the pipe connects to manholes, inlets, or catch basins, the sections will be measured to the outside face of the structure.
- F. Basis of Payment: The accepted quantities of pipe will be paid for at the contract unit price per linear foot.
- G. Testing: See Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

2.5 REINFORCED CONCRETE PIPE (RCP)

- A. Description: For furnishing and installing complete and in place reinforced concrete pipe for the storm sewer. The bid price shall include, but will not be limited to, all cost for labor, materials, tools, equipment, backfill material, backfilling, excavation, and compaction. The pipe shall have joints of the tongue and groove type (with O ring gasket).
- B. General Requirements: All pipe installed shall meet or exceed the criteria outlined in ASTM CO-76 for Class IV. The curing of all reinforced concrete pipe to be used under the Contract shall be in accordance with ASTM specifications C 76-72. The pipe shall be cured for a sufficient length of time so that the concrete will develop the specified compressive strength as 28 days or less. However, under NO circumstances will any pipe be accepted on the job site that is less than fourteen (14) days old.
- C. Backfilling: The CONTRACTOR shall not backfill sewers above the top of the pipe until the sewer elevations, gradient, alignment and the pipe joints have been installed correctly. The ENGINEER or his duly authorized agent shall retain the capacity to check, inspect, and approve all sewer elevations, gradient, alignment, and pipe joints at any time during construction.

All sewer pipe as soon as laid shall have the space between the pipe and the bottom and sides of the trench packed full by hand and thoroughly tamped and compacted with a shovel or light tamper, as fast as placed, in lifts not to exceed four (4) inches up to a depth of at least eight (8) inches above the top of the pipe. The filling shall be carried up evenly on both sides. Care shall be taken that no rock, frozen material, or other hard substances are placed in contact with the pipe.

Material for backfilling the space between the pipe and the bottom and sides of the trench and for covering to a depth of two (2) feet, shall be clean dry earth, free from stones larger than two (2) inches, frozen material or other hard substances (except for conditions hereinafter defined).

The remainder of the trench shall be backfilled by using the material originally excavated from the ditch (except for conditions hereinafter defined), to a height slightly above the original elevation of the ground. Backfilling shall not be left unfinished for more than 400 feet behind the completed masonry or pipe work.

No heavy rock shall be dropped into the trench nor placed within three (3) feet of the sewer pipe. In depositing rock in the trench care must be taken that the rock does not injure the structure. All spaces between pieces of rock shall be filled with earth to insure there being no voids.

Backfilling from eight (8) inches above the top of the pipe to final grade shall be made in lifts not exceeding two (2) feet depth, and shall meet the compaction requirements in Section 01000 of the 1997 City of Elkhart Standard Construction Specifications.

All backfill material shall be "B" borrow or better or shall be approved by the ENGINEER.

- D. Method of Measurement: The footage of pipe to be paid for will be based on the total length of pipe used. When the pipe connects to manholes, inlets, or catch basins, the sections will be measured to the outside face of the structure.
- E. Basis of Payment: The accepted quantities of pipe will be paid for at the contract unit price per linear foot.
- F. Testing: See Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

2.6 VITRIFIED CLAY PIPE (VCP)

- A. Description: The bid price shall include, but will not be limited to, all cost for labor, materials, tools, equipment, backfill material, backfilling, excavation, compaction. The pipe shall have joints constructed of a flexible plastic material conforming to the latest revision of ASTM designation C-425, using materials having resilient properties such as Wedgelock by Logan Clay Products Co. or any approved equal.
- B. General Requirements: All pipe installed shall meet or exceed the criteria outlined in the latest revision of ASTM C-700 Standard Specifications for extra strength vitrified clay pipe. Vitrified clay pipe shall be used in all Industrial areas.
- C. Fittings: For the furnishing and installing VCP rubber gasket "TEE" connectors meeting ASTM C-425 standard to produce a positive water tight connection for all pipes entering the main sewer. The connections shall be manufactured to accept 6 inch VCP. The location of these "TEE" connectors will be determined by the ENGINEER in the field.
- D. Backfilling: The CONTRACTOR shall not backfill sewers above the top of the pipe until the sewer elevations, gradient, alignment and the pipe joints have been installed correctly. The ENGINEER or his/her duly authorized agent shall retain the capacity to check, inspect, and approve all sewer elevations, gradient, alignment, and pipe joints at any time during construction.

All sewer pipe as soon as laid shall have the space between the pipe and the bottom and sides of the trench packed full by hand and thoroughly tamped and compacted with a shovel or light tamper, as fast as placed, in lifts not to exceed four (4) inches up to a depth of at least eight (8) inches above the top of the pipe. The filling shall be carried up evenly on both sides. Care shall be taken that no rock, frozen material, or other hard substances are placed in contact with the pipe.

Material for backfilling the space between the pipe and the bottom and sides of the trench and for covering to a depth of two (2) feet, shall be clean dry earth, free from stones larger than two (2) inches, frozen material or other hard substances (except for conditions hereinafter defined).

The remainder of the trench shall be backfilled by using the material originally excavated from the ditch (except for conditions hereinafter defined), to a height slightly above the original elevation of the ground. Backfilling shall not be left unfinished for more than 400 feet behind the completed masonry or pipe work.

No heavy rock shall be dropped into the trench nor placed within three (3) feet of the sewer pipe. In depositing rock in the trench care must be taken that the rock does not injure the structure. All spaces between pieces of rock shall be filled with earth to insure there being no voids.

Backfilling from eight (8) inches above the top of the pipe to final grade shall be made in lifts not exceeding two (2) feet depth, and shall meet the compaction requirements in Section 01000.

All backfill material shall be "B" borrow or better or shall be approved by the ENGINEER.

- E. Method of Measurement: The footage of pipe to be paid for will be based on the total length of pipe used. When the pipe connects to manholes, inlets, or catch basins, the sections will be measured to the outside face of the structure.
- F. Basis of Payment: The accepted quantities of pipe will be paid for at the contract unit price per linear foot.
- G. Testing: See Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

2.7 FORCE MAIN

- A. Description: In general, the force main under this item shall be installed using the same procedures and workmanship as described for the "Water Main" in Section 900 of the 1997 City of Elkhart Standard Construction Specifications. All bends shall be provided with concrete blocking between the pipe and undisturbed ground as a part of this item.

The location of the force main may be shifted during the course of construction by the ENGINEER to avoid interference with existing utilities whose exact location are not known. No additional compensation will be allowed for shifting of the force main to avoid such interference. The CONTRACTOR shall locate all existing utilities prior to the start of the construction.

- B. Material: Pipe materials for the force main shall be D.I.P. meeting the requirements of AWWA C151, Class 52. Fittings shall be mechanical joint fittings with body thickness and radii of curvature conforming to ANSI Standard A21.10, and joints in accordance with Section 11-2.3 of ANSI Standard A21.11, Class 250 gray iron.
- C. Method of Measurement: The actual number of linear feet of force main, constructed as shown on the plans, as specified, or as ordered by the ENGINEER, will be measured along the centerline of the pipe. The beginning point for measurement at the lift station will be the outlet from the gate valve as shown on the plans, furnished with the lift station. The end point shall be the terminal manhole. No extra compensation will be made for fittings.

- D. Basis of Payment: The accepted quantities of pipe will be paid for at the contract unit price per linear foot.
- E. Testing: See Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

PART 3 STRUCTURES

3.1 MANHOLE

- A. Description: For furnishing and installing complete and in place manholes on the sanitary/storm sewer. The bid price shall include, but will not be limited to, all cost for labor, materials, tools, equipment, backfill material, backfilling, excavation, compaction, cast iron frames, and covers.

Specifications shall be in strict conformance with Section 720 of the Indiana Department of Transportation Standard Specifications, 1995.

If existing sections or subsequent additions to those specifications vary with said State Highway Specifications, or if variances occur on the plans or are directed by the ENGINEER, said variances shall not be construed to invalidate those parts of the section of the State Highway Specifications which are not in variance or conflict, and the variances together with the remaining portion of the State Highway Specifications not in conflict, shall constitute the specifications for these structures.

- B. Material: The manholes shall be at least 48" inside diameter, have inverts poured and finished in a professional manner to the desired shape and use high performance flexible connectors meeting ASTM C 923 standard on all pipes nominal size 18" or less entering the manhole. The cast iron frames and covers shall be Neenah Foundry Company, Catalog No. 1772-A with type B lid, East Jordan Iron Works, Catalog No. 1022-1 with HD lid or any approved equal and shall be installed to final grade and positioned out of the tire path of the street pavement. All taps into existing manholes shall be cored use high performing flexible connectors meeting ASTM C 923 standard on all pipes nominal size 18" or less entering the manhole.
- C. Method of Measurement: Manholes both new and reconstructed will be measured by the unit.
- D. Basis of Payment: All the cost for tapping existing manholes and any cost for installing manholes not specifically mentioned above shall be merged into the cost of this bid item.

3.2 CATCH BASIN

- A. Description: For furnishing and installing complete and in place catch basins. The bid price shall include, but will not be limited to, all cost for labor, materials, tools, equipment, backfill material, backfilling, excavation, compaction, cast iron frames, and covers.
- B. Material: The catch basins shall be at least 36 inches inside diameter, have inverts poured and finished in a professional manner to the desired shape and use high performance flexible connectors meeting ASTM C 923 standard on all pipes nominal size 18" or less entering the manhole. The cast iron frames and grates shall be Neenah Foundry Company, Catalog No. R3070 or approved equal. The precast concrete manhole sections must follow the ASTM C478-85 specifications or approved equal.

- C. Method of Measurement: Catch basins both new and reconstructed will be measured by the unit.
- D. Basis of Payment: The accepted quantities of catch basins adjusted to grade and castings furnished and adjusted to grade will be paid for at the contract unit price per each complete in place.

3.3 INLETS

- A. Description: For furnishing and installing complete and in place inlets. The bid price shall include, but will not be limited to, all cost for labor, materials, tools, equipment, backfill material, backfilling, excavation, compaction, cast iron frames, and covers.
- B. Material.: The inlets shall be at least 36" inside diameter, have inverts poured and finished in a professional manner to the desired shape and use high performance flexible connectors meeting ASTM C 923 standard on all pipes nominal size 18" or less entering the manhole. The cast iron frames and grates shall be Neenah Foundry Company, Catalog No. R-3070 or approved equal. The precast concrete manhole sections must follow the ASTM C478-85 specifications or approved equal.
- C. Method of Measurement: Inlets both new and reconstructed will be measured by the unit.
- D. Basis of Payment: The accepted quantities of catch basins adjusted to grade and castings furnished and adjusted to grade will be paid for at the contract unit price per each complete in place.

3.4 BORING AND JACKING PIPE

- A. Description: This work shall consist of jacking steel pipe through or under an embankment in accordance with these specifications and in reasonably close conformance with the lines and grades shown on the plans or as directed.
- B. Material: This pipe shall be electric-fusion, arc-welded steel pipe in accordance with ASTM A139, Grade B, or electric-resistance welded pipe in accordance with ASTM A53, Type E, Grade B, as applicable. Material furnished under this specification shall be covered by a Type C certification in accordance with INDOT Standard Specification, 1995 Section 916.
- C. Jacking: This method shall consist of pushing steel pipe into the embankment. All pipe shall be handled, unloaded, and stacked so as to prevent any damage to the joints of the pipe. This section shall follow INDOT Standard Specification, 1995 Section 716.
- D. Boring: This method shall consist of pushing pipe into the fill with a boring auger rotating within the pipe to remove spoil. This section shall follow INDOT Standard Specification, 1995 Section 716.
- E. Method of Measurement: Jacked pipe of the various types and sizes will be measured by the linear foot in place.
- F. Basis of Payment: The accepted quantities of jacked pipe will be paid for at the contract unit price per linear foot for the types and sizes specified complete in place.

3.5 LIFT STATION

- A. Description: The Lift Station will be equipped with two submersible raw sewage pumps as described in the plans and project specifications for each system.

The rated horsepower of the motors shall be not less than 5 Hp for 460 volt, 3 phase power. All openings and passages shall be large enough to pass 3-inch diameter spheres and any stringy material or trash which may pass through a 6-inch house connection. Pumps shall have pump suction and discharge openings at least four (4) inches in diameter.

Note: Pump curves and RPM's other than those shown above may be acceptable if approved by the ENGINEER. Pumps shall be manufactured by Flygt, ABS, KSB, or other approved manufacturers.

1. Pump Design: The pump design shall be such that pumping units will be automatically connected to the discharge piping when lowered into place of the discharge connection. The pumps shall be easily removable for inspection or service requiring no bolts, nuts or other fastenings to be removed for this purpose, and no need for personnel to enter pump well. Each pump shall be fitted with a stainless steel chain, shackles and any accessory that is connected to the chain shall be made of a stainless steel of adequate strength and length to permit raising the pump for the inspection and removal.

The pumps and other electrical equipment, fixtures, and wiring in the lift station wet well must conform to the NEMA Type 7 designation for explosion proof equipment. Intrinsic safety barriers shall be provided for the transducer and back up floats.

2. Pump Construction: The stator casing, oil casing, and impeller shall be of grey iron construction, with all external parts coming into contact with sewage protected by a coat of rubber-asphalt paint. All external bolts and nuts shall be of stainless steel. A wear ring designed for abrasion resistance shall be installed at the inlet of the pump to provide protection against wear to the impeller. The impeller shall be of a double vane, non-clog design, capable of passing solids, fibrous material, heavy sludge, and constructed with long throughway with no acute turns.

Each pump shall be provided with a tandem double mechanical seal running in an oil reservoir, composed of two separate lapped face seals. The lower consisting of one stationary tungsten-carbide ring and one rotating carbon ring, with each pair held in contact by separate spring. The seals shall require neither maintenance nor adjustment, and shall be easily replaceable. Conventional double mechanical seals with a single or double spring between the rotating faces shall also be allowed.

A sliding guide bracket shall be separate from and bolted to the pump unit and the pump bracket shall have a machined connecting flange to connect with the cast iron discharge connection, which shall be bolted to the floor of the sump and so designed as to receive the pump connecting flange without the need of any bolts or nuts.

Sealing of the pumping unit to the discharge connection shall be accomplished by a single linear downward motion of the pump with the entire weight of the pumping unit guided by 1 or 2 guide bars or cables to and pressing tightly against the discharge connection; no portion of the pump shall bear directly on the floor of the sump and no rotary motion of the pump shall be required for sealing. Sealing at the discharge connection by means of a

diaphragm, O-ring, or similar method of sealing shall be accepted as an equal to a metal contact of the pump discharge and mating discharge connection. Guide bars shall be stainless steel.

Pump motor shall have Class F insulated windings which shall be moisture resistant. The motor shall be NEMA Design B rated 155 C maximum. Pump motors shall have cooling characteristics suitable to permit continuous operation, in a totally, partially or non-submerged condition. The pump shall be capable of running dry continuously in a totally dry condition. Cable junction box and motor shall be separated by a stator-lead sealing gland or terminal board which shall isolate motor from any water or solids gaining access through pump top. Pump motor cable shall be suitable for submersible pump applications and this shall be permanently embossed on the cable.

Pump motors shall include heat sensors in windings to stop pumps if overheating occurs. Also each pump shall have moisture sensors with appropriate relay to indicate seal failure.

3. Pump Warranty: The pump manufacturer shall warrant the pumps being supplied to the Owner against defects in workmanship and materials for a period of five (5) years under normal use, operation and service. In addition, the manufacturer shall replace certain parts which shall become defective through normal use and wear on a progressive schedule of cost for a period of five (5) years; parts included are the mechanical seal, impeller, pump housing, wear ring and ball bearings. The warranty shall be in published form and apply to all similar units.
4. Work Included: For the lump sum price bid for the Lift Station item the CONTRACTOR shall furnish all materials and do all work necessary to furnish and install complete and ready for operation the lift station together with all appurtenant items and structures as shown on the plans and as specified. The work included under this item includes the furnishing and installation of each complete automatic underground lift station with all equipment, structures, interconnecting piping, electrical work, and appurtenances from the inlet sewer of the wet well to the hub of the force main leaving the gate valve as shown on the plans and as specified.

Included under this item shall be all earth excavation, backfill, grading, sheeting, shoring, disposal of excess excavated materials, disposal of water, all masonry, sewage pumps, pipe and fittings, control system, paved parking area, guard posts, and all other material and operations necessary to install the lift stations as shown on the plans and as specified, complete and ready for operation except work which is specifically included under other Contract items.

5. Wet Well Structure: The lift station shall have a wet well as hereinafter specified and as shown on the plans. All concrete for the wet well structures shall be 3,500 PSI concrete.

The walls of the wet wells shall be constructed using reinforced concrete pipe conforming to ASTM Designation C-478 with a 5 inch maximum wall thickness and circular reinforcement. Pipe shall have cement mortar joints with asphaltic gaskets.

Furnish and install one aluminum access door and frame, complete with hinged and hasp equipped cover, upper guide holders, chain holder and cable holder in each pumping station. Frame shall be securely mounted above the pumps. The doors shall be torsion bar loaded and have safety locking handles in the open position. Doors shall have checkered plate.

Furnish and install guide bars per the manufacturers recommendations for each pump to permit raising and lowering pumps.

Intermediate guide rail supports shall be required for wet wells deeper than twelve (12) feet. They shall also be required for each additional ten (10) feet (i.e., 22 foot structure shall require two (2) intermediates per bar).

For wet wells more than eight (8) feet deep a ladder shall be furnished and installed to facilitate maintenance.

Pump motor leads, transducer and float control wiring shall be terminated in an explosion-proof, moisture/waterproof enclosure at top of wet well for convenient access. Adequate strain relief connectors shall be used on motor leads and control wire extending into wet well.

6. Valve Vault And Portable Pump Discharge Vault: Valve vaults and portable pump discharge vaults for the lift stations shall be standard four (4) foot diameter manholes. Materials and installation of the manholes and the frames and cover shall conform to the requirements shown on the plans and the manhole specifications described.

Note: All access doors and hatches shall be aluminum and have provisions for padlocks and 1 lock shall be furnished for each door or hatch. The lock shall be keyed to match the Owners current padlock system.

7. Pipe, Fittings and Valves: All pipe shall be Class 52 Ductile Iron Pipe with flanged fittings except as shown otherwise on the plans. Fittings shall conform to the requirements set forth in the Force Main item.

The gate valves to be furnished and installed under these items shall comply with all applicable provisions of the latest revision of AWWA Standard C509-80, Standard for Resilient Seated Gate Valves. Wedge shall be constructed of ductile iron, fully encapsulated in synthetic rubber except for guide and wedge nut areas. Wedge rubber shall be molded in place and bonded to the ductile iron portion, and shall not be mechanically attached with screws, rivets, or similar fasteners. Valve body and bonnet shall be epoxy coated inside and out. Unless otherwise specified below or otherwise shown on the plans, gate valves shall have non-rising stem, and a hand wheel for counter-clockwise opening. Where shown on the plans or required, the CONTRACTOR shall provide three (3) piece cast iron valve boxes with the valves.

Ball centric valves shall be installed where called for on the plans and shall be as manufactured by Keystone or other approved equal. Ball centric valves shall be flanged as called for on the plans.

Check valves shall be of the horizontally, double disc, swing type designed to allow a full diameter passage with a minimum pressure loss. They shall be provided with a screwed or bolted cover for easy access. All workmanship and material of the check valves shall be equal to the specifications for gate valves as applicable. The check valve shall be located between the shutoff valve and the pump and shall be rated for normal pressure and water hammer.

The CONTRACTOR shall install the piping in the portable pump discharge vault as shown on the plans. The CONTRACTOR shall install a quick connect fitting on the end of the wye connection in the vault suitable for easy connection to a hose. The CONTRACTOR shall also provide and install a watertight cap to connect to the wye to seal the force main when the connection is not in use.

8. Ventilation: Proper ventilation shall be provided for all pump stations. No interconnection of ventilation systems shall exist between wet wells and dry wells. All intermittently operated ventilation equipment shall be electrically interconnected with the respective lift station lighting systems. All manual ventilation and lighting switches shall override any automatic controls. All fan wheels shall be fabricated from non-sparking materials.

Dry wells that are located underground shall be provided with mechanical ventilation in accordance with the following: Continuous ventilation that provides at least six (6) complete air changes per hour, Intermittent ventilation that provides at least thirty (30) complete air changes per hour, combined ventilation consisting of ten (10) minutes of ventilation at a rate of thirty (30) complete air changes per hour followed by an automatic switch to six (6) complete air changes per hour may be used to conserve heat.

Wet wells with screens or mechanical equipment shall be equipped with permanently installed mechanical ventilation in accordance with the following: Continuous ventilation that provides at least twelve (12) complete air changes per hour, Intermittent ventilation that provides at least thirty (30) complete air changes per hour.

9. Control System: Furnish and install with each pump station one automatic control center in NEMA 4x stainless steel enclosures of sturdy, heavy gauge, all welded, sheet steel construction. The control center shall be Consolidated Electric or an approve equal.

The housing shall be mounted on a suitable power pedestal near the pump station (see plans) with sufficient space for the Waternet system (48" x 62" x 10") and shall have a double entry door. The inner door will contain all of the controls necessary for operation of the pumps and the outer door shall be able to be locked. The control center shall be designed to handle the incoming electrical service as shown on the plans, and shall be equipped with individual disconnect, across-the-line magnetic starters, overload protection in each phase, overload reset, hand-off automatic pump operation selector switch, pump running time meters, automatic transfer to non-operating pump in event of overload in operating pump, moisture sensor indicators, temperature sensor, lightning protection, surge protection, and terminal board with connection for high and low water level alarm. There shall also be a 110 GFI receptacle in the control panel. Unless specifically noted, the CONTRACTOR shall assume single phase power is not available and shall supply in the cabinet a sufficient transformer to operate controls and power the GFI receptacle. There shall also be a condensation heater with a thermostat to keep the telemetry and other control cabinet components from freezing up. These are considered critical electrical spare parts and an extra set will be provided and delivered to the Wastewater Maintenance Department. Finally, furnish and install a consolidated level transducer or an approved equal. The control center system shall provide for the automatic alternation of the sewage pumps and provision for the lag pump to start in the event that the inflow of raw sewage exceeds the capacity of the lead pump. A warning light shall be mounted on the control center and shall be so connected as to function when the high water or low water elevation in the wet well is reached. The alarm system shall be provided with a disconnect switch for operation in the event of a power failure. All electrical equipment shall be stocked by local suppliers. The control system shall be wired as shown on the wiring schematic enclosed at

the end of the specifications or unless approval for an alternate schematic is given by the ENGINEER.

10. Controller:

1. To control the levels in the wet well a Consolidated Electric Model D152 level controller shall be provided as an integral part of the pump station control panel. The controller shall consist of a display/setpoint board and a submersible level transducer. The display/setpoint board shall be mounted on the face of the enclosure.
2. The controller shall provide a full-range differential control for two pumps plus high and low level alarm response to the signal received from the transducer. It shall operate on 120 VAC and include the motor starter pilot circuitry for operation of the pump. The high and low level alarms shall have an external fail safe dry contact for the remote alarm indication.
3. The level shall be visually observable on the 40 segment LED bar graph display on the face of the module. Level adjustments shall be made by moving pins in accordance with the bar graph to the desired level of control activation/deactivation. The programming pins shall allow for forty possible positions for setting the "on" level for each pump; the "off" level for each pump; the alarm "on" levels and the alarm "off" levels.
4. The controller shall provide automatic or manual operation of each pump based on a selector switch on the face of the module. In the automatic mode the pumps shall alternate lead-lag operation on each start cycle. In the manual mode either pump shall be able to be selected as the lead pump.
5. Four LED's shall be provided above each setpoint to indicate status for the respective condition. An alarm reset push button shall also be provided to silence an ongoing alarm.
6. A wet well level simulation switch shall be provided to allow the operator to simulate a rise or fall in wet well level. The simulation switch will turn on and off pumps/alarms based on the artificial level introduced by the operator. Upon release of the simulation switch, the level shall return to the actual reading received from the transducer.
7. It is specific intention of this functional requirement that a standard controller will be employed with features as herein described and that it be a fully-integrated assembly. That is, the furnishing of similar functions using a generic programmable controller with custom software, a multiplicity of setpoint modules or extensive relay/timer logic to accomplish control sequences, etc., is specifically precluded by this specification and will not be acceptable.
8. The controller furnished under this specification shall be comprehensively integrated with the specified submersible level transducer type wet well level sensing system and associated motor control equipment and circuitry. It shall be a Model D152 as manufactured by Consolidated Electric Company of St. Paul, MN. It shall be furnished with all necessary drawings and instructions and placed in successful automatic operation. It shall be guaranteed for one (1) year from date of startup and

acceptance to the effect that any defects in material or workmanship shall be corrected without cost of obligation to the Owner.

11. Transducer:

1. The liquid level transducer shall be a 4-20 MADC, w-wire, 15-40 VDC loop-powered type with its output signal directly proportional to the measured level excursion over a factory-calibrated range of zero (0) to ten (10) feet of water.
2. The transducer shall be of the solid state head-pressure sensing type, suitable for continuous submergence and operation and shall be installed in accordance with manufacturer's instructions. The bottom diaphragm face of the sensor shall be installed 12 inches above the floor of the wet well. The sensor shall be mounted using a 1" vertical stainless steel pipe and cable system at the location shown on the drawings.
3. The transducer housing shall be fabricated of type 316 stainless steel with a bottom diaphragm 2 5/8" diameter of heavy-duty, limp, foul-free, molded Teflon bonded to a synthetic rubber back/seal. A hydraulic fill liquid behind the diaphragm shall transmit the sensed pressure to a solid state variable capacitance transducer element to convert the sensed pressure to a corresponding electrical value.
4. The sensed media shall exert its pressure against the diaphragm with flexes minutely so as to vary the proximity between an internal ceramic diaphragm and a ceramic substance to vary the capacitance of an electrical field created between the two surfaces. A stable, hybrid, operational amplifier assembly shall be incorporated in the transducer excite and demodulate the sensing mechanism. The transducer shall incorporate laser-trimmed, temperature compensation and high quality components and construction to provide a precise, reliable, stable output signal directly proportional to the sensed pressure over a factory calibrated range.
5. The transducer element shall incorporate high over-pressure protection and be designed to withstand intermittent over-pressures five times the full scale range being sensed. Metallic diaphragms shall not be acceptable in that they are subject to damage or distortion.
6. Sensing principles employing LVDT's, resistive or pneumatic shall not be acceptable.
7. The transducer shall include easily accessible offset and span adjustments in the upper assembly. Span shall be adjustable down 15% of the sensor range. Fine and coarse adjustments for both span and offset shall be provided, using 25-turn potentiometers. Offset and span adjustments shall be non-interactive, for ease of calibration.
8. The internal pressure of the lower transducer assembly shall be relieved to atmospheric pressure through a heavy duty urethane jacketed hose/cable assembly and a slack PVC bellows mounted in the NEMA 3R enclosure.

The sealed breather system shall compensate for variations in barometric pressure and expansion and contraction of air due to temperature changes and altitude as well as prevent fouling from moisture and other corrosive elements.

9. The transducer shall be provided with a cable suspension kit to reduce strain on the electrical cable.
12. Redundant Pump Control: A redundant back-up control system shall be provided. The back-up control shall run one pump while simultaneously indicate "high water alarm". The controller shall keep the station operational until the normal control system can be returned to proper operation.
 1. The back-up system shall activate only when high wet well level trips the high level float. This switch shall be set at an elevation above the normal operating range of the station to insure the switch is kept out of debris. The high level switch shall be a Consolidated Electric Model B100 LSA-X.
 2. The controller shall be wired in such a manner as to achieve the above described redundant control alarm feature. The controller shall be a Consolidated Electric Model CB1T.

The Consolidated Electric D152 and the A1000 transducer shall be used or an approved equal. If the CONTRACTOR chooses a different type, this must be submitted in writing to ENGINEER. This will be reviewed, and if approved, an initialized copy will be sent back to the CONTRACTOR.

All control wires shall be tagged with permanent plastic at each termination.

13. Electrical Work: All electrical work shall conform to applicable provisions of the local and National Electrical Codes.

The CONTRACTOR shall provide and install the electrical service entrance including the underground service and meter socket, and shall mount the control system enclosure on the power pedestal. The CONTRACTOR shall run the necessary conductors and conduit underground to connect the motors to the control system enclosure. The CONTRACTOR shall provide a backup power supply connection compatible with City of Elkhart equipment (see the ENGINEER to arrange inspection by the maintenance supervisor for the WWTU).

The CONTRACTOR shall provide and install a light fixture in the wet well with a switch in the control panel.

The CONTRACTOR shall be responsible for providing electricity for the lift station until the ENGINEER accepts the installation.

All electrical components shall be protected against corrosive conditions and each flexible cable shall be provided with a watertight seal and separate strain relief.

14. Telemetry Unit: A telemetry unit shall be part of the control and monitoring system. The lift station telemetry unit shall be manufactured by Motorola, and be a MOSCAD RTU or approved equal as described in the project plans and specifications, including a Yagi style antenna with sufficient height to transmit and receive signals to and from the City of Elkhart's central repeater tower. All equipment must be approved by the City ENGINEER. The CONTRACTOR shall furnish, and provide installation of the telemetry unit in accordance with the City of Elkhart's and the manufacturer's requirements, and shall provide written verification of telemetry unit's performance optimization.

15. Shop Drawings: The CONTRACTOR shall supply the ENGINEER with three (3) copies of detailed shop drawings of the lift station for approval prior to ordering: Prior to start up of the lift station, the CONTRACTOR shall supply the ENGINEER with three (3) copies of an operating and maintenance manual for the lift station which shall include a list of all parts, components, appurtenances and "As-Built" drawings of the installation. Following start up the CONTRACTOR shall supply the ENGINEER two (2) copies of the start up report.

B. Method of Measurement: Lift stations will be measured by the unit.

C. Basis of Payment: All the cost for installing lift stations and any cost not specifically mentioned above shall be merged into the cost of this bid item.

PART 4 BITUMINOUS PAVEMENT

4.1 HOT ASPHALT CONCRETE

A. Hot Asphaltic Concrete Base Course #5D:

1. Description: All requirements for the base course shall conform to the requirements of TYPE 5D Base mixture as set forth in Section 403.04 of the INDIANA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, 1995. The weather limitations shall be as specified in Section 401.05 of the INDIANA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, 1995.
2. Material: #5D aggregate base course shall be used.
3. Method of Measurement: Hot asphalt concrete pavement will be measured by the square yard.
4. Basis of Payment: The accepted quantities of hot asphalt concrete pavement including base, binder, and surface will be paid for at the contract price per unit.
5. Testing: See Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

B. Hot Asphaltic Concrete Binder Course #8 or #9:

1. Description: The binder course mix compositions and proportions shall conform to the limits as set forth in Section 403.04 of the INDIANA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATION, 1995. A tack coat is required as directed by the ENGINEER. The weather limitations shall be as specified in Section 401.05 of the INDIANA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, 1995.
2. Material: #8 or #9 aggregate binder course shall be used depending on what is specified.
3. Method of Measurement: Hot asphalt concrete pavement will be measured by the square yard.

4. Basis, of Payment: The accepted quantities of hot asphalt concrete pavement including base, binder, and surface will be paid for at the contract price per unit.
5. Testing: See Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

C. Hot Asphaltic Concrete Source #8, #9 or #11:

1. Description: The required course shall be a one (1) course densely graded and compacted wearing surface of one and one-half (1 1/2) inch in thickness. The surface mix compositions and proportions shall conform to the limits as set forth in Section 403.04 of the INDIANA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, 1995. Only limestone or air cooled blast furnace slag will be accepted aggregate. Gravel aggregate will not be accepted. A tack coat is required as directed by the ENGINEER. The weather limitations shall be as specified in Section 401.05 of the INDIANA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, 1995.
2. Material: #8, #9, or #11 aggregate surface course shall be used depending on what is specified.
3. Method of Measurement: Hot asphalt concrete pavement will be measured by the square yard.
4. Basis of Payment: The accepted quantities of hot asphalt concrete pavement including base, binder, and surface will be paid for at the contract price per unit.
5. Testing: See Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

4.2 PAVEMENT REMOVAL (ROTO-MILL)

- A. Description: For the rotomill removal and off site disposal of pavement. The price shall include, but not be limited to, all costs for labor, tools, equipment and fees for the satisfactory removal and off-site disposal of the existing pavement. This item shall include the removal of asphaltic concrete from the gutter and driveways. All joints to existing pavement shall be saw cut.
- B. Method of Measurement: This item will be a lump sum bid.
- C. Basis of Payment: The lump sum price will be paid and shall be full compensation for the estimated quantities shown in the contract.

PART 5 RIGID PAVEMENT

5.1 PORTLAND CEMENT CONCRETE PAVEMENT

- A. Description: Concrete pavement shall be constructed in accordance with plans prepared by the ENGINEER. The concrete pavement shall be constructed according to Sections 501.01-501.22 or the INDOT Standard Specifications, 1995.

- B. Material: The concrete shall have crushed limestone for the aggregate, local gravel WILL NOT be allowed. The concrete shall have 5 gallons of water per sack of cement and shall be capable of reaching 4000 psi in 28 days.
 - 1. Forms: The forms shall be set true to line and grade shall be approved by the ENGINEER or his duly authorized agent.
 - 2. Finishing: The concrete pavement shall be finished by steel trowels shaped such as to conform to the appearance as shown on the plans. After finishing steel trowels, the curb shall be lightly brushed.
 - 3. Curing: Immediately upon completion of the finishing the Pavement shall be cured by the use of a membrane forming material.
 - 4. Crack and Joint Sealing: The joint sealing materials shall conform to the requirements of Section 906.02 of the INDOT Standard Specifications, 1995. Only single component low modulus silicone sealants which are self leveling will be accepted.
- C. Cross Slope: The CONTRACTOR shall, at the CONTRACTOR's own expense, establish a minimum of three sixteenth (3/16) inch fall per one (1) foot of cross slope to a maximum of five sixteenth (5/16) inch of fall per one (1) foot of cross slope. The full responsibility for keeping the cross slope within the aforementioned limits shall rest upon the CONTRACTOR, and the CONTRACTOR shall be subject to the check and review of the ENGINEER.
- D. Method of Measurement: Portland cement concrete pavement will be measured in square yards of the type and thickness specified.
- E. Basis of Payment: The accepted quantities of concrete pavement will be paid for at the contract unit price per square yard for the type and thickness specified complete in place. This price and payment will be full compensation for furnishing and placing materials, including, but not limiting to, any steel mesh or joints that are needed.
- F. Testing: See Section 1000 of the City of Elkhart 1997 Standard Construction Specifications.

PART 6 MISCELLANEOUS CONSTRUCTION

6.1 SIDEWALKS, CURB RAMPS AND STEPS

- A. Description: Concrete sidewalk shall be constructed in accordance with plans prepared by the City ENGINEER. The concrete shall be constructed according to Sections 604.01-604.05 of the INDOT Standard specifications, 1995.
- B. Material: The concrete shall have crushed limestone for aggregate, local gravel WILL NOT be allowed. The concrete shall have 5 gallons of water per sack of cement, with a minimum of 6 bags of cement per cubic yard of concrete, and shall be capable of reaching 4000 psi in 28 days.
- C. Portland Cement Concrete Sidewalks and Curb Ramps:
 - 1. Grades: The walk shall have a transverse downward slope toward the street of one quarter (1/4) inch vertical to twelve (12) inches horizontal width. At all streets and alley and drive

approaches the sidewalk will be ramped with a maximum slope of one (1) inch vertical to twelve (12) inches horizontal to meet the street or approach pavement.

2. Joints: Expansion joints, formed by using a piece of performs joint material one half (1/2) inch thick, and to the size and shape of the sidewalk shall be placed against existing sidewalk before pouring and at every 100 linear feet. All joints are to be edged and finished to present a neat appearance.
 3. Finishing: The concrete sidewalk shall be finished with a float. After finishing, the sidewalk shall be lightly brushed.
 4. Curing: Immediately upon completion of the finishing the curbing shall be cured by the use of a membrane forming material.
 5. Forms: The forms shall be set true to line and grade and shall be approved by the ENGINEER or his duly authorized agent.
 6. Paving Machine: Sidewalk paving machines may be used provided the sidewalk can be constructed to the requirements of the specifications.
- D. Method of Measurement: Portland cement concrete pavement will be measured in square yards of the type and thickness specified.
- E. Basis of Payment: The accepted quantities of concrete pavement will be paid for at the contract unit price per square yard for the type and thickness specified complete in place. This price and payment will be full compensation for furnishing and placing materials, including, but not limiting to, any steel mesh or joints that are needed.

6.2 CONCRETE CURB

- A. Description: For the construction of new concrete curb and gutter. The curb and gutter shall match the existing profile of the curb and gutter. The bid price shall include, but not be limited to, all cost for labor, materials, tools, equipment, backfill material, backfilling, excavation and compaction. The concrete shall be in accordance with the specifications and requirements in the Standard Specifications for the City of Elkhart, 1997 and any addendum.
- B. Material: The concrete shall have crushed limestone for the aggregate, local gravel WILL NOT be allowed. The concrete shall have 5 gallons of water per sack of cement and shall be capable of reaching 4000 psi in 28 days.
- C. Cast in Place Cement Concrete Curbing:
1. Joints: Butt joints, formed by using a piece of preformed joint material three quarter (3/4) inch thick, but to the size and shape of the curb, shall be placed against existing curb before pouring. All joints are to be edged and finished to present a neat appearance.
 2. Finishing: The concrete curb shall be finished by steel trowels shaped such as to conform to the appearance as shown on the plans. After finishing by steel trowels, the curb shall be lightly brushed.

3. Curing: Immediately upon completion of the finishing the curbing shall be cured by the use of a membrane forming material.
 4. Forms: The forms shall be set true to line and grade and shall be approved by the ENGINEER or his duly authorized agent.
 5. Curb Machine: Curb machines may be used provided the curb can be constructed to the requirements of the specifications.
- D. Method of Measurement: Curbing will be measured by the linear foot along the front face of the section at finished grade elevation.
- E. Basis of Payment: The accepted quantities of concrete pavement will be paid for at the contract unit price per linear foot for the type and thickness specified complete in place. This price and payment will be full compensation for furnishing and placing materials, including, but not limiting to any steel mesh or joints that are needed.

6.3 COMBINED CONCRETE CURB AND GUTTER

- A. Description: For the construction of new concrete curb and gutter. The curb and gutter shall match the existing profile of the curb and gutter. The bid price shall include, but not be limited to, all cost for labor, materials, tools, equipment, backfill material, backfilling, excavation and compaction.

The concrete shall be in accordance with the specification and requirements in the Standard Specifications for the City of Elkhart, 1997 and any addendum.

- B. Material: The concrete shall have crushed limestone for aggregate, local gravel WILL NOT be allowed. The concrete shall have 5 gallons of water per sack of cement and shall be capable of reaching 4000 psi in 28 days.
- C. Cement Concrete Curb and Gutter:
1. Joints: Butt joints, formed by using a piece of preformed joint material three quarter (3/4) inch thick, but to the size and shape of the curb, shall be placed against existing curb before pouring. All joints are to be edged and finished to present a neat appearance.
 2. Finishing: The concrete curb shall be finished by steel trowels shaped such as to conform to the appearance as shown on the plans. After finishing by steel trowels, the curb shall be lightly brushed.
 3. Curing: Immediately upon completion of the finishing the curbing shall be cured by the use of a membrane forming material.
 4. Forms: The forms shall be set true to line and grade and shall be approved by the ENGINEER or his duly authorized agent.
 5. Curb Machine: Curb machines may be used provided the curb can be constructed to the requirements of the specifications.

- D. Method of Measurement: Curbing will be measured by the linear foot along the front face of the section at finished grade elevation.
- E. Basis of Payment: The accepted quantities of concrete pavement will be paid for at the contract unit price per linear foot for the type and thickness specified complete in place. This price and payment will be full compensation for furnishing and placing materials, including, but not limiting to, any steel mesh or joints that are needed.

6.4 CURB REMOVAL

- A. Description: Curbing which is unsuitable for resetting and which has not been damaged due to negligence, shall be removed and disposed of as directed.
- B. Method of Measurement: Curbing will be measured by the linear foot along the front face of the section at finished grade elevation.
- C. Basis of Payment: The accepted quantities of concrete pavement will be paid for at the contract unit price per linear foot for the type and thickness.

6.5 SHOULDER DRAINS

- A. Description: The excavation shall be to the depth and shape of the bottom of the type and size of the side ditch being constructed, the details of which are shown on the plans.
- B. Material: The material used will be in accordance with the details which are shown on the plans.
- C. Method of Measurement: Shoulder drains will be measured by the linear foot along the edge of the pavement.
- D. Basis of Payment: This item is incidental to the contract.

6.6 RIPRAP AND SLOPEWALL

- A. Description: This work shall consist of placing protective coatings of broken stone or concrete which may or may not be grouted, precast slabs, or sloped wall in accordance with these specifications and in conformance with the grades and thickness shown on the plans. Section 616.01 of the INDOT Standard Specifications, 1995.
- B. Material: Shall be in accordance with Section 616.02 INDOT Standard Specifications, 1995.
- C. Placing Dumped Riprap: Dumped riprap shall be placed at locations specified on the plans or as directed. The finish surface shall vary no more than 9" from a true plane. Section 616.03 of the INDOT Standard Specifications, 1995.
- D. Placing Hand Laid Riprap: The thickness of hand laid riprap shall be no less than that specified on the plans. Section 616.04 of the INDOT Standard Specifications, 1995.
- E. Method of Measurement: Riprap that is dumped shall be measured by the ton. Riprap that is hand laid will be measured by the square yard.

- F. Basis of Payment: Riprap that is dumped shall be paid for by the ton. Riprap that is hand laid will be based on square yard. Both will be paid for from the given unit price.

PART 7 TRAFFIC AND SIGNALIZATION CONSTRUCTION

7.1 PAVEMENT TRAFFIC MARKINGS

- A. General: Pavement Traffic Markings materials and construction shall meet the requirements of Section 808 of the INDOT Standard Specifications, 1995.
- B. Hot Thermoplastic Marking Material: Hot Thermoplastic marking material shall be used on bituminous pavements and meet the requirements of section 808.06 (b)1 of the INDOT Standards Specifications, 1995.
- C. Preformed Plastic Marking Material: Preformed Plastic marking material may be used on either bituminous pavement or concrete pavements in accordance with the manufacturers installation requirements and shall meet the requirements of section 808.06(b)2 of the INDOT Standard Specifications, 1995.
- D. Epoxy Marking Material: Epoxy marking material shall be used on concrete pavement and meet the requirements of section 808.06(b)3 of the INDOT Standard Specifications, 1995.
- E. Snowplowable Raised Pavement Markers: Snowplowable raised pavement markers shall meet the requirements of section 808.10 of the INDOT Standard Specifications, 1995.

.06 Basis Of Payment: The accepted quantities will be paid for on a line item basis per the contract unit price.

7.2 SIGNALIZATION

- A. General:
 - 1. Quality: All equipment furnished under this specification shall be substantially constructed and shall be of thoroughly good quality in design, material, workmanship and finish. It shall be the product of a responsible American Manufacturer, having established reputation and extensive experience in the manufacture of traffic control equipment.
 - 2. Warranty: The manufacturer's normal warranties for all equipment for which guarantees are normally provided shall be assigned and delivered to the City. Should any defect develop under normal and proper use within one (1) year after acceptance by the Owner, such defect shall be corrected by and at the expense of the CONTRACTOR. Costs for provisions and performance of guarantees and warranties herein described shall be incidental to and included in the unit price(s) bid for the various traffic control items.
 - 3. Uniformity: All like pieces of equipment shall be of the same type and manufacturer in order to assure uniformity, interchangeability of components, single responsibility and most satisfactory service.

4. Maintenance: During the various construction phases and all test periods the CONTRACTOR shall provide maintenance on all installed equipment. This includes maintenance on all hardware equipment from the time the equipment is installed to the day of final acceptance of the complete system.

Normal maintenance of existing individual signal controllers shall remain the responsibility of the City of Elkhart throughout the duration of the project.

5. Minimum Design Requirements: All Traffic Signal Items shall meet the requirements of section 913.15 Traffic signal materials and equipment of the INDOT Standard Specification, 1995.
 6. The Materials and Installation of Traffic Signals shall be in accordance with section 805 of the INDOT Standard Specification, 1995.
- B. Traffic Signal Controller: For the furnishing and installation of a solid state controller with hard wired back panel and NEMA PLUS Conflict Monitor, cabinet and concrete foundation all of which shall meet the requirements of Sections 805 and 913.15(a) of the INDOT Standard Specifications 1995. Two packets described as packets #2&3 in 913.15(a) shall be furnished. One will be placed in the controller cabinet and one will be sent to the City of Elkhart Public Works Traffic Division. The Controller and Cabinet manufacturer and model number shall be approved by the City Public Works Traffic Division.
- C. Traffic Signal Mast Arm Structure (TRUSS-TYPE ARM):
1. General: The Traffic Signal Mast Arm & Pole shall consist of:
 1. A round pole complete with anchor base, anchor bolts, hand hole, cable inlet with grommet, grounding lug and pole top.
 2. A truss-type tapered bracket arm complete with wire inlet and protecting grommet, clevis clamp, and chain lug for properly supporting a traffic signal.

All castings shall be clean, smooth, with all details well defined and true to pattern. The mast arm pole and mast arm shall be made from the same material. The mast arm shall be secured to the pole by means of circular clamps, one-half of which is welded to the mast arm, and stainless steel bolts. Welding shall be in accordance with Section 711.32 of the INDOT Standard Specifications, 1995.
 2. Minimum Design Requirements: The traffic signal pole arm and all appurtenances shall meet the requirements of Section 913.15(e)3 of the INDOT Standard Specifications, 1995. The mast arm assembly shall consist of a tapered upper and lower member securely joined by means of vertical struts and spacer plates. Each tapered member shall be formed to a constant width, producing a continuously tapered, uniformly shaped, elliptical section. The pole, anchor base and mast arm shall be aluminum alloy 6036-T6.
 3. Combination Signal-Luminaire Pole and Mast Arms: The combination pole and the signal and luminaire mast arms shall meet the requirements of section 913.15(e)3 of the INDOT Standard specification 1995 and sections (A) and (B) above. The combination pole and mast arms material shall be an aluminum alloy 6063-T6.

4. Shop Drawings: The CONTRACTOR shall submit two (2) sets of shop drawings to the Elkhart City ENGINEER's Office for approval.
- D. Traffic Signal Steel Strain Pole: The strain poles shall meet the requirements of sections 805 and 913.15(e)1 of the INDOT Standard specification, 1995 and shall be capable of supporting a 8,000# load per section 913.15(e)1b. The Strain poles shall be provided with 6 bands per pole, anchor bolts, and the base skirt.
- E. Foundations: Foundations shall meet the requirements of section 805.13 of the INDOT Standards Specifications, 1995.
- F. Span Wire: Aircraft cable span and catenary suspension shall meet the requirements of section 913.15(f)2 of the INDOT Standard Specifications, 1995.
- Tether cable shall meet the requirements of section 913.15(f)1 of the INDOT Standard Specifications 1995.
- G. Aluminum Signal Pedestal: The aluminum pole shall meet the requirements of Section 913.11(a)7b(2&3) and 913.15(d)7 of the INDOT Standard Specifications, 1995.
- H. Pedestal Foundation Type "A": The foundation shall meet the requirements of Section 913.15(a)7b(1) and 913.15(d)7 of the INDOT Standard Specification, 1995.
- I. Luminaire Mast Arm: Luminaire mast arms shall meet the requirements of Sections 913.11(a) of the INDOT Standard Specification, 1995.
- J. Luminaire: Luminaires shall meet the requirements of sections 913.11(d) of the INDOT Standard Specification, 1995.
- K. Signal Indications: Signal indications shall be die cast aluminum. The indications installation and materials shall meet the requirements of section 805.05 and 913.15(d)1 of the INDOT Standard specifications 1995. The signal indications shall be twelve (12) inches.
- The certification of signal indications shall be within twelve (12) months prior to the CONTRACTOR purchase date.
- L. Pedestrian Indications: The pedestrian indications shall meet the requirements of Section 913.15(d)2 of the INDOT Standard specification 1995. The indications shall consist of the symbol message for "Walk" and "Don't Walk" as shown in the IMUTCD 1988. All lens shall meet the latest standards of I.T.E. (Polycarbonate Lens are acceptable). All signal bodies, cases, and faces shall be painted Federal Yellow. The visors to be the cut-away style (cap visor) painted Federal Yellow, on the outside and flat black on the inside. The "Walk/Don't Walk" Indications shall be twelve (12) inches.
- M. Traffic Signal Service Point: A meter base is required for the supply of service. The service shall be installed on wooden "H" frame as shown on the detail and plan drawings. The service shall have a 50 A Main Lug only and a weatherproof panel U.L. labeled "Suitable for Use as Service Equipment." The service shall meet the requirements of Section 805.08 and 913.15(i) of the INDOT standard specification 1995.
- N. Traffic Signs: New Sign installation and materials shall meet the requirements of section 913.10 of the INDOT Standard Specification, 1995. The sign material shall use Encapsulated Lens (High

Intensity) Reflective sheeting according to section 913.10(d). All new or existing traffic signs throughout the project shall be maintained by one of the means described herein. The various circumstances and the relative technique to be applied to each are as follows:

1. Side-of-Pole Mounted Signs: CONTRACTOR shall provide all mounting hardware, labor, equipment, and miscellaneous items for the installation of existing and new traffic signs to be mounted on the traffic signal poles as shown in the plans or as directed by the ENGINEER. Existing signs that are to remain shall be removed, cleaned, and reinstalled onto the new signal poles as directed by the ENGINEER.
2. Overhead Mounted Signs: CONTRACTOR shall provide all mounting hardware, labor, equipment, and miscellaneous items for overhead installation of existing and new traffic signs to be mounted on traffic signal mast arms or strain pole span and catenary cable as shown in the plans or as directed by the ENGINEER.
3. Ground Mounted Signs: All existing ground mount traffic signs and street name signs within the project limits that are to remain after construction is completed, but are in conflict with the new construction shall be removed, relocated temporarily outside the construction area and reinstalled in a suitable location most closely duplicating the original location as possible. No separate payment shall be made for maintaining existing traffic signs.

O. Overall Mounted Street Name Signs (18" High Required Length):

1. Street Sign Material: The Street Name Sign Face material shall conform to "Standard Specification - 1995 INDOT" Section 913.10(d) Encapsulated lens (High Intensity) Reflective sheeting.
2. Sign Thickness: The Aluminum Sign Blanks shall be fabricated from 100 inch minimum thickness sheet aluminum and shall otherwise conform to "Standard Specifications 1995 INDOT" Section 913.10(a). The sign blank shall have a corner radius of 2".
3. Street Sign Face: Street Name Sign Faces shall be single face reversed screened silver on green.
4. Length of Street Sign: The length shall be determined by the number of letters in the street name, including the prefixes and suffixes. The face shall have a minimum length of 48 inches, but may include lengths of 60 inches and 72 inches. The height shall be 18 inches.
5. Lettering of Street Sign: Street name signs of 48", 60" or 72" standard lengths shall be fabricated using the following size and series capital letters:

<i>Lengths</i>	<i>Street Name or Number</i>	<i>Suffix and Prefix</i>
48" Length	8" D Series	8" D Series
60" Length	8" D Series	8" D Series
72" Length	8" B,C,D Series	8" B,C,D Series

To provide maximum legibility, the widest series letter shall be used whenever possible for each of the standard lengths specified. A minimum distance of two (2) inches shall be allowed between legend and the border. Each sign shall have a one (1) inch outside border with a one (1) inch corner radius.

6. Abbreviations: If the legend is too large to fit a seventy-two (72) inch face using "B" Series letters, approval to abbreviate the street name or use a longer face shall be obtained from the ENGINEER at no extra cost to the project.

Standard abbreviations for street, avenue, boulevard, etc. shall be used following the street name or number.

7. Legends: Legends shall be optically centered and spaced both horizontally and vertically. Letter spacing shall be consistent with conventional traffic sign letter spacing practices for best legibility.

Faces shall show careful workmanship. Legend shall be clean-cut and sharp.

8. Prior Approval: The successful bidder shall, prior to fabrication, submit two (2) copies of shop drawings to the ENGINEER for approval. The drawings shall include the recommended length of face and letter series for each street name.
9. Street Sign Mounting: The street name signs shall be mounted either on the signal mast arm using two (2) mid-mast arm sign mounting bracket assemblies or on the strain pole span and catenary wire using two (2) sign mounting bracket assemblies. The sign shall be mounted as near as practical to the pole shaft. Specifications for mid-mast arm sign mounting bracket assembly are contained elsewhere herein.
10. Payment: Payment for each street name sign furnished and installed shall be made at the unit price per each as contained in the itemized proposal.

P. Mid Mast Arm Sign Mounting Bracket Assembly:

1. Purpose: The purpose of this specification is to provide minimum standards for an adjustable mid mast arm sign mounting bracket.
2. Adjustability of Bracket Assembly: The bracket assembly shall be adjustable to accommodate the following movements in alignment of the traffic sign.
 1. Vertical Adjustment.
 2. Rotational Adjustment about mast arm (tilt).
 3. Rotational Adjustment in vertical plane.
3. Attachment to Mast Arm: The attachment of the bracket to the mast arm shall be adjustable (without special tools or equipment) to fit the commonly found mast arm shapes. These shapes include, but are not limited to, round, octagonal and elliptical. The bracket shall be provided with Type 201 stainless steel bands or other easily adjustable method to fasten the bracket to the mast arm (See detail drawings at the back of the specifications).
4. Sign Accomodation: The bracket shall attach to the sign by means of a formed tube section arm (see detail drawings at the back of the specifications). The vertical section shall be securely attached to the vertical adjustment section.

5. Materials:

1. The formed tube shall be extruded from 6036-T6 aluminum.
2. Attaching brackets shall be cast from grade 32510 malleable iron.
3. The Type 201 Stainless Steel Band shall have a minimum thickness of .050 and a minimum tensile strength of 100,000 psi. Each band shall be complete with screw buckle.
4. Each bracket shall be complete with all necessary bolts, nuts etc. to attach the traffic sign to the racket to the supporting arm.

6. Finish:

1. All aluminum parts shall have an Alodine 1200 finish or equal.
2. All steel or malleable iron parts shall have a cadmium or zinc finish.

Q. Miscellaneous Equipment: The CONTRACTOR shall furnish and install all the necessary miscellaneous equipment to make a completed and operating installation of traffic signals according to the plans, standard sheets, standard specifications, and the accepted practice of the industry. This equipment shall consist of, but not necessarily be limited to, the following items:

1. Intercepts.
2. Span Hangers.
3. Signal Weatherheads.
4. Balance Adjusters.
5. Pinnacle Assemblies.
6. Padlocks.
7. Ground Rods.
8. Ground Grid Connector.
9. Thermo Weld Grounding Connection.
10. #6 Bare Wire.
11. ¼" Messenger Cable.
12. 2 Bolt Clamps.
13. 3/8" Servi-Clips.
14. 3/8" Crosby Clamps.

15. Post Top Slipfitter.
16. Post Top Slipfitter for Cabinets.
17. 1" Conduit Bushings.
18. 1" Conduit Straps.
19. 1" Conduit Lock Nuts.
20. 1" Conduit Ground Bushings.
21. 1" Weatherheads.
22. 1" Close Nipples.
23. 2" Ground Coupling.
24. 2" Conduit Ground Bushings.
25. 90 degree Conduit Bends.
26. 2" Weatherheads.
27. 1c/14 Stranded Coded Wire (6 colors); not to be used as loop cable.
28. 1c/14 Stranded Coded Wire (white); not to be used as loop cable.
29. 2" Close Nipples.
30. 2" Condulets.
31. 3 Bolt Clamps.
32. 67 Watt Lamps.
33. 116 Watt Lamps.
34. 150 Watt Lamps.
35. Highway Yellow Enamel.

All brackets and miscellaneous fittings will be fabricated from aluminum and have bare aluminum sandblasted finish.

NOTE: Cost of Miscellaneous Equipment to be included in costs of all other items.

- R. Conduit: Conduit shall be galvanized rigid steel and shall meet the requirements of section 913.15(j) of the INDOT Standard Specification, 1995. If a blockage is encountered while pushing conduit and cannot be passed after several push attempts, the CONTRACTOR shall excavate and remove the obstruction, and continue pushing operations. All excavation and repair of blockages

as well as excavation and repair of push holes shall be per specifications and the cost of this work distributed among the various related pay items.

Free-Duct conduit shall be an acceptable alternate for Polyvinyl chloride (PVC) conduit for use in detector housings, ground rod entries, and magnetometer installations. This use will be for minor quantities only.

- S. Handhole: Handhole material shall meet the requirements of section 805.02 of the INDOT Standard Specifications, 1995. Casting shall meet section 913.15(h) of the INDOT Standard Specification, 1995.
- T. Signal Cable: There shall be no cable splices. permitted anywhere below surface grade. All signal wire shall be stranded wire and shall meet the requirements of section 805 and 913.15 (f)4 of the INDOT Standard Specification, 1995.

A separate, uninterrupted cable shall be run from the controller to each mast arm or pedestal for each vehicular signal head (or group of heads having the same indications simultaneously) which is to be installed on the mast arm or pedestal. A separate cable shall be run from each signal indication to the pole base for splicing into the feeder cable. No splicing shall be permitted except at designated termination points in the signal head.
- U. Ground Wire: Ground wire is to be solid cable in accordance to section 913.15 (f) 4 of the INDOT Standard Specification, 1995.
- V. Loop Detectors: Loop detectors installation and material shall meet the requirements of sections 805.09 and 913.15(f)4e of the INDOT Standard Specifications, 1995. The sealant shall be of a one component polyurethane material.
- W. Aluminum Detector Housing: Aluminum detector housing installation shall meet the requirements of section 805.08 of the INDOT Standard Specification, 1995.
- X. Vehicle Detectors: Vehicle detectors shall meet the requirements of sections 913.15(a) of the INDOT Standard Specifications, 1995. The vehicle detectors manufacturer and model number shall be approved by the City Public Works Traffic Division.
- Y. Connections: All cable connections to terminal posts shall be made with appropriate fork tongue connectors with crimped connections to signal cables.
- Z. Underground Installation: When pulling new cable, cable basket grips or similar devices shall be used. Pulling directly on the conductors in a cable shall not be permitted.
- AA. Hangers: Disconnect hangers will be used only where called out.
- AB. Hand Hole Removal: The CONTRACTOR shall remove those hand holes, rings and covers as directed by the ENGINEER or shown to be removed on the plans. No separate payment shall be allowed for this work which shall be included in the lump sum item for Removal of Existing Traffic Signal Equipment. Any hand holes with existing live cables to remain in place shall not be removed.
- AC. Salvageable Traffic Signal Equipment: The City of Elkhart Public Works Traffic Division shall designate which items, if any, shall be salvaged and remain the property of the City of Elkhart. It shall be the CONTRACTOR's responsibility to remove these items in reusable condition and store

them at the Traffic Division's garage located at 619 South Fifth Street, south of Harrison Street. The remaining items shall be removed and disposed of by the CONTRACTOR.

- AD. Backfill: The CONTRACTOR shall use "B" Borrow for Structure Backfill in backfilling of all trenches, push holes, around foundations, hand holes, manholes and any other structures in conformance with applicable provisions of Section 211 of INDOT Standard Specifications, 1995. Payment for "B" Borrow for Structure Backfill for traffic signal installations shall be included in the unit prices bid for the related items.
- AE. Basis of Payment: The accepted quantities will be paid for on a line item basis per the contract unit price.

PART 8 LANDSCAPE

8.1 SEEDING

- A. Description: Spreading of topsoil and seeding of parkways and lawns.
- B. Material: The grass seed shall consist of and be sown at the rate of 40 pounds of Kentucky blue grass, 10 pounds of red top, 10 pounds of white clover, and 10 pounds of farm rye per acre.
- C. Preparation of Ground Before Seeding: On all areas designated to be seeded, the backfill, fill and embankments shall be brought to a subgrade level four (4) inches below finished grade.

When the subgrade has settled, topsoil shall be deposited and spread to a finished depth of at least four (4) inches and fine raked, ready a for seeding.

- D. Areas Ready for Seed: The areas shall be lightly raked, loose and pulverized. Grass seed shall then be sown by a mechanical seeder, operating in two directions, and lightly raked into the surface and rolled once with a light hand roller. The seeded areas shall be thoroughly watered with a fine spray in such a manner as not to wash out the seed.

The CONTRACTOR shall use care in raking, not to destroy the finished grade, nor to disturb uniform distribution of seed. Sowing of seed shall be done only within the seasons extending from August 15th, to October 15th, and from April 1st, to June 1st unless otherwise approved by the ENGINEER.

- E. Method of Measurement: The spreading of seed and topsoil will be considered a lump sum item in the bid.
- F. Basis of Payment: Payment will be based on a lump sum price which will be paid when the grass has grown.

8.2 SODDING

- A. Description: Sod shall be laid in the designated direction and shall be fitted to the surrounding grade and fixed objects. The strips shall be butted closely, but not overlapped. After laying and watering, the sod shall be tamped or rolled to ensure contact with the soil underneath. After compaction the sod shall present an even surface with no lumps or depressions.

- B. Preparation of Ground Before Sodding: The area where sod is to be placed shall be smooth, uniform, and meet the required cross section. The depth shall be set so the sod will match the existing surrounding surface.

The surface shall be loosened to a depth of 2 inches and then raked. All waste materials shall be removed.

- C. Watering Sod: Immediately after laying any sod it shall be watered. The amount of water shall be sufficient to saturate the sod and the upper few inches of the underlying soil. The sod shall be watered once everyday for the first week, once every second day for the second week, and once every third day for the third week, and once a week thereafter. Sod shall be maintained for a minimum of four weeks from the time it is laid before being accepted. During periods of ample rainfall, watering may be modified to simulate the above schedule.
- D. Method of Measurement: The laying of sod and topsoil will be considered a lump sum item in the bid.
6. Basis of Payment: Payment will be based on a lump sum price which will be paid when the sod has taken hold and is growing.

8.3 PLANTING TREES AND SHRUBS

A. Description:

1. Protection of Trees: No trees outside slope-stake limits are to be damaged or trimmed unless permission is granted by the ENGINEER.
2. Inspection of Work: All work done pursuant to this section 35 shall be subject to the inspection of the City Forester, City of Elkhart, Elkhart Department of Parks and Recreation, Division of Forestry.
3. Tree Specifications: All trees shall be grown within Zone 5.

The CONTRACTOR shall supply and plant only trees that meet the standards set forth in the current edition of American Standards for Nursery Stock, and be free of disease and insects.

All trees shall be free of branches to a point not to exceed 60 percent of actual height. Trunks shall be straight and true. Shade trees shall be with one central leader without forking. Measurements shall be based on the following criteria: All trees are to be calipered six inches above the ground.

All shade and ornamental trees are to be 3 to 4 inches in caliper, balled and burlapped.

4. Planting Specifications: Pits dug shall be a minimum of 12 inches larger in diameter than the diameter of the root ball. Plants shall be planted no deeper than previously grown with due allowance to settling.

Set tree in planting pit, then backfill with mixture of existing soil (if material is not suitable in the opinion of the City Forester, the CONTRACTOR shall be responsible for supplying

at no additional cost, suitable backfill). Trees shall be thoroughly watered as backfilling progresses.

The CONTRACTOR shall notify the City Forester of the Park and Recreation Department who the supplying nurseries for the Contract will be. It shall be the prerogative of the City Forester or his representative, to personally inspect all trees to be planted under the Contract if he or his representative deems such inspection necessary.

Hardwood double-shredded bark mulch shall be installed around base of tree to form a circle of diameter 4 ft.

5. Wrapping, Maintenance, and Warranty: All trees shall and be wrapped with the standard 4" tree wrap starting from the base of the tree up to the lowest branch. Wrap shall be secured with jute twine.

CONTRACTOR shall submit typewritten instructions recommending procedures to be established by the Himco Site Trust for maintenance of landscape work, to begin at the final acceptance of the project, for one full year.

The CONTRACTOR shall warranty in writing to the Himco Site Trust and City of Elkhart all trees for three years after final acceptance of the project.

Should the CONTRACTOR fail to comply with any or all of the specifications herein specified concerning the handling and planting of said trees at the time of original planting, the CONTRACTOR shall be responsible for the replacement and replanting of the trees listed above under these specifications.

- B. Method of Measurement: The planting of trees will be a per unit item.
- C. Basis of Payment: Payment will be based on a lump sum price which will be paid when the trees are placed and approved by the City Forester.

PART 9 WATER CONSTRUCTION

9.1 DUCTILE IRON WATER MAIN

- A. Description: Water main shall be installed and tested as per the manufacturer's instruction and as per the latest revision AWWA Standard C-600. Pipe shall be disinfected as per the latest revision of AWWA Standard C-651.

All water mains shall have a minimum cover of 5 feet and shall have a maximum cover of 6 feet unless otherwise determined by the City ENGINEER or an approved representative.

All water main shall be laid to the alignment and depth shown on the plans unless directed otherwise by the ENGINEER. All pipes shall be bedded firmly on undisturbed earth with bell holes excavated beneath the bells. Should the CONTRACTOR excavate to a depth below the invert of the pipe without the directions of the ENGINEER, the pipe shall be laid on shaped bedding with compacted granular fill between the pipe and undisturbed earth at the CONTRACTOR'S expense.

Proper implements, tools, and facilities shall be provided and used for the safe and convenient performance of the work. All pipe, fittings, valves, and hydrants shall be lowered carefully into the trench in such a manner as to prevent damage to water main materials, protective coatings and linings. Under no circumstances shall water main materials be dropped or dumped into the trench.

B. Where necessary, the trench shall be dewatered prior to installation of the pipe:

1. Examination of material: All pipe, fittings, valves, hydrants, and other appurtenances shall be examined carefully for damage and other defects immediately before installation. Defective materials shall be marked and held for inspection by the ENGINEER, who may prescribe corrective repairs or reject the material.
2. Pipe ends: All lumps, blisters, and excess coating shall be removed from the socket and plain ends of each pipe, and the outside of the plain end and the inside of the bell shall be wiped clean and dry and be free from dirt, sand, grit, or any foreign materials before the pipe is laid.
3. Cleaning And Swabbing: If dirt enters the pipe, it shall be removed and the interior pipe surface swabbed with a 1 percent hypochlorite disinfecting solution. If in the opinion of the ENGINEER, the dirt remaining in the pipe will not be removed by the flushing operation, then the interior of the pipe shall be cleaned by mechanical means such as a hydraulically propelled foam pig or other suitable device acceptable to the ENGINEER, in conjunction with the application of a 1 percent hypochlorite disinfecting solution to the interior pipe surface. The cleaning method used shall not force mud or debris into the interior pipe-joint spaces and shall be acceptable to the ENGINEER.
4. Pipe Placement: As each length of pipe is placed in the trench, the joint shall be assembled and the pipe brought to correct line and grade. The pipe shall be secured in place with approved backfill material.
5. Pipe Plugs: At times when pipe-laying is not in progress, the open ends of pipe shall be closed by a watertight plug or other means approved by the ENGINEER. The plug shall be fitted with a means for venting. When practical, the plug shall remain in place until the trench is pumped completely dry. Care must be taken to prevent pipe flotation, should the trench fill with water. Prior to removal of the plug for extending the line or for any other reason, air and/or water pressure in the line shall be released.
6. Flooding by Storm or Accident During Construction: If the main is flooded during construction, it shall be cleared of the flood water by draining and flushing with potable water until the main is clean. The section exposed to the floodwater shall then be filled with a chlorinated potable water that, at the end of a 24-hour holding period, will have a free chlorine residual of not less than 25 mg/l. The chlorinated water may then be drained or flushed from the main. After construction is completed, the main shall be disinfected.
7. Backfilling: The CONTRACTOR shall not backfill water main above the top of the pipe until the alignment and the pipe joints have been checked, inspected and approved by the ENGINEER.
 1. All main, as soon as laid, shall have the space between the pipe and the bottom and sides of the trench packed full by hand and thoroughly tamped with a shovel or light tamper, as fast as placed in layers not exceeding four (4) inches up to the level of at

least eight (8) inches above the top of the pipe with at least one tamping for each man depositing material in the trench. The filling shall be carried up evenly on both sides. Care shall be taken that no rock, frozen material, or other hard substances are placed in contact with the pipe.

2. Material for backfilling the space between the pipe and the bottom and sides of the trench, and, for covering the pipe to a depth of two (2) feet, shall be clean dry earth, free from stones larger than two (2) inches, frozen material or other hard substances (except for conditions hereinafter defined).
3. The remainder of the trench shall be backfilled by using the material originally excavated from the ditch (except for conditions hereinafter defined), to a height slightly above the original elevation of the ground. Backfilling shall not be left unfinished for more than 600 feet behind the completed pipe work.
4. No heavy rock shall be dropped into the trench nor placed within three (3) feet of the pipe. In depositing rock in the trench, care must be taken that the rock does not injure the structure. All spaces between pieces of rock shall be filled with earth to insure there will be no voids.
5. Backfilling from the top of the pipe to final grade shall be made in lifts not exceeding twelve (12) inches in depth, and shall be compacted to meet the requirements of 90% modified proctor for all areas not within the limits of the main travel portion of the road-bed and 95% modified proctor for all areas within the limits of the main travel portion of the road-bed.
6. The CONTRACTOR shall secure the services of a qualified testing firm to perform the above compaction testing. Test results shall be furnished to the ENGINEER and shall be certified by a professional engineer licensed in the State of Indiana. Costs for testing shall be merged into respective water main items.
8. Disinfection: General disinfection of new water mains and fixtures will be the obligation of the CONTRACTOR in charge of the installation. The CONTRACTOR will sterilize the water main according to the following:
9. Flushing: After completing the new main installation, it shall be flushed with water of sufficient velocity (minimum 10 ft. per sec.) to remove all dirt and other foreign material and a pressure and leakage test run. This flushing test will be done under Water Works supervision. To determine approximate flow for flushing, assume an average flow from a 2 1/2" nozzle of a hydrant will be approximately 1,000 gallons per minute from a 4 1/2" nozzle approximately 2,500 gallons per minute. Normally a hydrant will be located 20 feet or less from the end of the main. If no hydrant is within 20 feet of the end of the main a 2" or larger tap shall be installed in the plug at the end of the main.
10. Disinfection: When the flushing process has been completed, a properly adjusted calcium hypochlorite solution will be injected into the main with the use of a hypochlorinator. The chlorine will be fed at a constant rate into the new main to obtain a residual concentration of not less than 50 mg/l (50 PPM). The chlorine residual should be checked at intervals to insure that the proper level is maintained. Chlorine application should continue until the entire main is filled with water having a minimum 50 mg/l (50 PPM) residual. The water should remain in the main for a minimum of 24 hours, during which time all valves, hydrants, etc. along the main must be operated to insure their proper disinfection.

Following the 24 hour disinfection period, the new main shall be flushed as above to reduce the chlorine residual below 1 mg/l (1 PPM). A bacteriological test as prescribed by the City of Elkhart shall be performed, (3 satisfactory tests on samples taken 24 hours apart). If the results fail to meet this minimum standard, the disinfecting procedure must be repeated and the results again tested before placing the main in service. Samples for this test will be performed and taken by the City of Elkhart. It is the CONTRACTOR's responsibility to make arrangements with the City of Elkhart at least 48 hours in advance with the analysis on Monday through Thursday.

Disinfection, Alternate Method: CONTRACTOR may elect to insert the proper amount of calcium hypochlorite in each length of pipe as it is laid. If pipe is carefully handled and kept clean during laying this method will normally give satisfactory results. Several cautions must be observed. First, when filling the pipe initially the water must be introduced slowly to keep the calcium hypochlorite from being flushed to the end of the main. Second, the chlorinated solution must be left in the main a minimum of 72 hours. During this 72 hours all valves, hydrants, etc. along the main must be operated to insure their proper disinfection and to remove all air from the line. The pressure and leakage test may be run at any time after the air has been expelled from the line. At the end of the 72 hour (or longer) period the main must be flushed as described above under the paragraph entitled Flushing until the chlorine residual has been reduced below 1 PPM. Then bacteriological tests as outlined in above shall be taken. If tests do not prove satisfactory it will then be necessary to again disinfect the main using the procedure set forth in above under disinfection.

11. Pipe Materials: The pipe shall meet the requirements of the latest revision of AWWA Standard C—151. Sizes 12 inch nominal diameter and smaller shall be Class 52. Sizes 16 inch nominal diameter and larger shall be Class 51.

Each pipe shall have the weight and class designation conspicuously painted on it. In addition, each pipe shall have cast on it the manufacturer's mark and the year in which the pipe was cast. The size of the letters and figures shall be as large as practicable.

All pipe shall be furnished with "push on" type joints utilizing rubber gaskets to obtain a tight seal. Joints shall comply with all applicable provisions of the latest revision of AWWA Standard C-111. Joint lubricant shall be furnished by pipe manufacturer. Mechanical joint end, AWWA Standard C-111, may be substituted for push on joint pipe ends. All joint materials shall be furnished by the pipe manufacturer.

All pipe shall be furnished with 1/16" thickness cement mortar linings, which conform in all respects to the latest revision of AWWA Standard C-104. Cement mortar lining shall be provided with a seal coat. Pipe shall be bituminous coated on the outside.

Pipe shall be as manufactured by Clow, United States Pipe and Foundry, American Cast Iron Pipe Company, Griffin, or approved equal.

- C. Measurement and Payment: For the unit price bid per linear foot for the water main of the respective sizes as described in the project specifications, the CONTRACTOR shall furnish all pipe of the required sizes, fittings, joint materials, installation of pipe and fittings, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structures, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified. The actual number of linear feet of water main will be measured along the centerline of the pipe

from fitting to fitting center. A complete record drawing meeting City of Elkhart Water Works standards must be submitted to the utility before any water mains are accepted.

The location of the water main may be shifted during the course of construction by the ENGINEER to avoid interference with existing utilities whose exact locations are not known. No additional compensation will be allowed for the shifting of the water main to avoid such interference.

In general, the CONTRACTOR shall locate all existing utilities prior to the start or the construction.

- D. Testing: See Section 1000 of the City of Elkhart 1997 - Standard Construction Specifications.

9.2 DUCTILE IRON FITTINGS

- A. Description: The fittings to be furnished under this item shall comply with all applicable provisions of the latest revision of AWWA Standard C-110. Fittings shall be Class 350.

Each fitting shall have distinctly cast upon it the following information: manufacturer's mark, nominal diameters of all openings and the fraction of the circle on all bends. The letters and figures shall be cast on the outside and shall be as large as practicable.

Fittings shall be as manufactured by Clow, United States Pipe, American Cast Iron Pipe, Griffin, Tyler Pipe or approved equal.

All fittings shall be furnished with mechanical joint type ends as per the latest revision of AWWA Standard C-111. At joints where restraint is required "set screw" retaining glands (Clow fig. 1058 or equal) will be used and standard mechanical joint glands will be omitted. Restraint for additional lengths of pipe beyond fittings shall be calculated using the D.I.P.R.A. method of thrust calculations. Where additional restraint is necessary, mechanical joint pipe with retainer glands shall be used in place of slip joint pipe. Thrust blocking may be used in lieu of additional joint restraints.

- B. Weights of fittings are estimated using Clow specifications for full body fittings. Compact fittings will be allowed as an alternate.

1. Lining and Coating of Fittings. The fittings under this item shall be furnished with 1/16" thickness cement mortar linings, which conform in all respects to the latest revision of AWWA Standard C-104. The cement mortar lining shall be provided with a seal coat. Pipe and fittings shall be bituminous coated on the outside.
2. Mechanical Joint Retaining Glands. Glands shall conform to applicable portions of the latest revision of AWWA standard C-110, latest revision, and shall be manufactured from ductile iron.

Each gland shall have sufficient square head, with cup point, double heat treated parkerized steel set screws that, when the screws are installed with 75 foot pounds of torque, the cup points will bite into the surface of the pipe and prevent blow off or movement of the joint at line pressures up to 200 psi. Glands shall be Clow F-1058 or approved-equal.

Alternate joint restraint systems other than those discussed above will be substituted only after review and approval by the ENGINEER.

- C. Measurement and Payment: For the unit price bid per pound for the ductile iron fittings the CONTRACTOR shall furnish all fittings, joint material, installation of pipe and fittings, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structures, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified.

9.3 GATE VALVES AND BOXES

- A. Description: All gate valves furnished under this item shall conform to the latest revision of AWWA standard C-509 except as otherwise specified herein. Valves shall be Clow, Mueller or approved equal.

End connections shall conform to the latest revision of AWWA Standard C-111 for mechanical joints. All valves shall be resilient wedge with mechanical joint ends, 200 psi working pressure, non-rising stem, O-ring seals, open left (counter clockwise) with an operating nut and 2" square wrench nut.

All valve stems shall be high strength manganese bronze having a minimum tensile strength of 80,000 psi, a minimum yield strength of 32,000 psi and minimum elongation of 15% in two inches.

Stem seals may be of the O-ring type.

All valves shall be tested at a minimum of twice the working pressure of 200 psi.

The valve box shall be two piece, screw type, with 5 1/4" shaft. Top section, with cover, which shall be marked "Water", lower section with an enlarged base shall make up the valve box. Box to be adjustable from 45" to 66". Box shall be Tyler Pipe Industries or approved equal.

Valve Box Extension shall permit extending the above valve box by 20" or at a minimum to finished grade at all valve locations. The valve box extension shall be Tyler Pipe Industries or approved equal.

- B. Measurement and Payment: For the unit price bid this item shall include, but may not be limited to gate valves of various sizes, valve box, connecting pipe, joint materials, installation of pipe and fittings, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structure, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified.

9.4 BUTTERFLY VALVES AND BOXES

- A. Description: All butterfly valves furnished under this item shall be rubber seated, mechanical joint end connections complete with gaskets, followers and bolts and shall conform to the latest revision of AWWA standard C-504 unless otherwise specified herein. Valves shall be as manufactured by Claw, Dresser, Kennedy or approved equal.

Diameter of the clear waterway opening through each valve shall not be less than the nominal size of the valve (in inches) less one inch. Clear waterway opening to be stated on drawing.

Laying length dimensions need not conform to AWWA standards. Shafting material and size need not conform to AWWA standards provided higher strength corrosion resistant shaft material resulting in a greater safety factor than provided by AWWA standards is used. End connections shall conform to the latest revision of AWWA Standard C-111. Shaft materials and size to be stated on drawings.

Valves shall be installed underground in horizontal lines. Shafts shall be installed horizontally. Gear boxes shall be securely mounted to the valves and shall be fully submersible enclosed type having AWWA Standard valve operating nuts. Gear boxes to be Philadelphia Gear Corporation or equal. Gear boxes are to be factory filled with the correct grade and amount of lubricant.

All valves shall be tested at a minimum of twice the working pressure of 200 psi.

The valve box shall be two piece, screw type, with 5 1/4" shaft. Top section, with cover, which shall be marked "Water", lower section with an enlarged base shall make up the valve box. Box to be adjustable from 45" to 66". Box shall be Tyler Pipe Industries or approved equal.

Valve Box Extension shall permit extending the above valve box by 20" or at a minimum to finished grade at all valve locations. The valve box extension shall be Tyler Pipe Industries or approved equal.

- B. Measurement and Payment: For the unit price bid this item shall include but may not be limited to butterfly valves, valve box, connecting pipe, joint materials, installation of pipe and fittings, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans or as specified.

9.5 TAPPING VALVE AND SLEEVE

- A. Description: All tapping valves furnished under this item shall conform to the latest revision of AWWA Standard C-509 except as otherwise specified herein. Valves shall be Clow, Mueller or approved equal. All tapping valves shall be blocked.

The tapping valves shall be of the type suitable for installation with the corresponding tapping sleeves, and are not to be confused with standard gate valves. Valves shall be of same manufacture as tapping sleeves and be compatible with the City of Elkhart's tapping equipment.

End connections shall conform to the latest revision of AWWA Standard C-111 for mechanical joints. All valves shall be resilient wedge with mechanical joint ends, 200 psi working pressure, non-rising stem, O-ring seals, open left (counter clockwise) with an operating nut and 2" square wrench nut.

All valve stems shall be high strength manganese bronze having a minimum tensile strength of 80,000 psi, a minimum yield strength of 32,000 psi and minimum elongation of 15 percent in two inches.

Stem seals may be of the O-ring type.

All valves shall be tested at a minimum of twice the working pressure of 200 psi.

The valve box shall be two piece, screw type, with 5 1/4 inch shaft. Top section, with cover, which shall be marked "Water", lower section with an enlarged base shall make up the valve box. Box to be adjustable from 45" to 66". Box shall be Tyler Pipe Industries or approved equal.

Valve Box Extension shall permit extending the above valve box by 20" or at a minimum to finished grade at all valve locations. The valve box extension shall be Tyler Pipe Industries or approved equal.

The tapping sleeves to be furnished under this item shall comply with all applicable provisions of the latest revision of AWWA Standard C-110.

- B. Tapping Sleeves: The tapping sleeves shall be built in two sections, designed to be assembled around the existing mains without halting service. Bolts for fastening together the two section shall be closely spaced, located so as to assure uniform gasket pressure. Sleeves shall be 304 stainless steel Mueller H304 with S.S bolts and outlet flange or an approved equal by the City of Elkhart and will be compatible with the City of Elkhart's tapping equipment.

The sleeve shall have distinctly displayed upon it the following information: manufacturer's mark, nominal diameters of all openings and the fraction of the circle on all bends. The letters and figures shall be displayed on the outside and shall be as large as practicable.

- C. Measurement and Payment: For the unit price bid this item shall include, but may not be limited to the tapping valve, valve box, tapping sleeve, connecting pipe, joint materials, installation of valve, sleeve and fittings, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structure, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified with the exception of the tapping operation which shall be performed by City of Elkhart Water Works personnel.

9.6 FIRE HYDRANT ASSEMBLY

- A. Description: Listed below is approved fire hydrants as determined by the Water Department. Any other fire hydrants must be approved by the City ENGINEER or an approved representative.

1. East Jordan Iron Works ERS.
2. Clow Medallion.
3. Mueller Super-Centurion.
4. U.S. Pipe Hydrant.

All hydrants shall comply with all provisions of the latest revision of AWWA Standard C-502 and shall have the following characteristics and be approved by the City of Elkhart's Water Works.

Size of Hydrant Valve	5 1/4"
Inlet Connection	6"
Type of Inlet Joint	M.J.
Barrel Inside Minimum Diameter	7"
Barrel Metal Thickness	9/16"
Bury Depth (from ground line to bottom of inlet connection)	5' - 6"
Outlet Nozzles	2-2 1/2"
	1-4 1/2"
Paint Color	Yellow
Opening Directions	Clockwise
Operating Nut	1 1/4" Pentagon

Nozzle threads to conform to ASA Specification B-26 for "National Standard Fire-Hose Coupling Screw Threads."

All working parts of the hydrant shall be removable from the top of the hydrant without digging and without the use of a lifting device or special tools. Hydrant top casting is to be removable without shutting off the auxiliary water inlet valve.

Fire hydrants shall be of the compression type closing with the line pressure. The valve opening shall be 5 1/4 inches in diameter. The main valve assembly shall be designed so that the bronze seat ring threads into a bronze bushing in the shoe allowing the seat ring to be removed from above ground without excavation.

The bonnet section shall be designed so all bearing surfaces and stem threads are sealed in a lubricant reservoir and automatically lubricated each time the hydrant is operated. Hydrant shall be shipped complete with lubricant.

The hydrant shoe shall have a 6 inch mechanical joint inlet and at least two draft outlets.

The depth of bury shall be 5 feet 6 inches unless otherwise shown on the drawings.

Hydrants are to be furnished with a breakable feature that will break cleanly upon impact. This shall consist of a two part breakable safety flange and stem coupling or breakaway lugs and breakaway stem coupling. It shall be designed to permit 360 degree rotation of the upper barrel without removal of the ground line flange bolts. Those depending on breakable bolts only at the ground line flange as a safety device will not be acceptable. The Break-Away flange shall be no more than 2 inches above grade.

- B. Measurement and Payment: For the unit price bid this item shall include, but may not be limited to a 6" hydrant, 6" gate valve, box, tie rods, 6" ductile iron connecting pipe, 1 CYD of washed stone for drainage, fittings, joint materials, installation of pipe and fittings, excavation and backfill, removal and disposal of water, miscellaneous restoration, concrete blocking as required or shown on the plans, sheeting, shoring, and protection of existing structures, testing, cleanup, and all other operations necessary to complete the work as shown on the plans or as specified.

9.7 BORE AND JACK

- A. Description: In general the casing pipe shall be jacked into place to satisfactory grade and alignment using acceptable construction methods. All work shall be done in a workmanlike manner using sheeting or shoring as required to protect the workman and the existing structures and utilities. All work shall be done to the satisfaction of the City of Elkhart, as well as the ENGINEERS. The ends of the casing pipe shall be sealed with brick masonry and filled with pea stone after the carrier pipe is installed to prevent the entry of dirt and debris. After completion of work, the CONTRACTOR shall leave the site in a better or equal condition than prior to start of construction.

Proper warning signals will be provided during construction as required by the City of Elkhart. All costs incurred during the construction of the pipe crossing the highway, testing, and meeting the approval of the Himco Site Trust shall be at the expense of the CONTRACTOR.

The carrier pipes referred to shall consist of those pipes carrying water across the highway crossing. The carrier pipes shall be of the size and material type supplied for the water main. The carrier pipes shall be subject to the same tests as required for water main.

The length of casing pipe shall be as shown on the plans and shall be watertight throughout its length except at the ends. The casing pipe shall be of smooth wall steel with a yield strength of 35,000 PSI and shall be of the diameter and wall thickness as shown on the plans. The casing pipe joints shall be welded as they are installed and the interior and exterior of the pipe shall be coated with a protective asphaltic barrier. The inner diameter of the casing pipe has been selected to provide minimum tolerance for the installation of the carrier pipe. The CONTRACTOR may, at his expense, use a larger inner diameter casing pipe if he so desires.

- B. Measurement and Payment: For the unit price bid per lineal foot for the bore and jack of the respective sizes as shown on the plans the CONTRACTOR shall furnish all materials and operations necessary to construct the carrier piping complete inside a casing pipe beneath and across the highway. This includes excavation and backfill of jacking pits, sheeting, pipe and jointing, casing pipe, warning signs for traffic, disposal of excess materials removal and disposal of water, surface restoration, protection of existing structures and utilities, testing and other related work not specifically called for under other contract items.

The bore and jack will be measured for payment between the ends of the casing pipe. The CONTRACTOR will be paid his unit price for each foot of bore and jack of the respective size actually installed which price shall be payment in full for all work and materials including the carrier pipe within the casing. The carrier pipe will not be measured separately for payment under any other item. The locations for the bore and jack crossings will be staked in the field by the ENGINEER according to the project plans. Field adjustment of the length or location of bore and jacked crossings and quantities thereto will be made or approved by the ENGINEER.

9.8 WATER SERVICE CONNECTIONS

- A. Description: Service connections shall be in accordance with the latest revision of AWWA Standard C-800 and with the following City of Elkhart standards.

Taps to the water main shall be made so that the corporation cock is to be installed 45 degrees from the vertical axis of the main. The corporation cock shall be with Mueller Oricorp H-15008 with Mueller CC threads X 1" copper compression or approved equal.

The service line shall be 1 inch type K copper installed with 60" minimum 72" maximum cover. The service line shall be laid 90 degrees to the main in a location to be determined by the ENGINEER in the field. Generally, the determined location shall be located near the property line appropriate for the most direct or shortest route from the service shut off to the home. The route shall be selected to avoid plantings, landscaping, driveways, sidewalks, and other exterior appurtenances wherever possible. The entry point to the home or business will also be field determined and will be as close as possible to the existing connection of the interior plumbing to the existing water well supply line.

All water service leads in Elkhart County crossing undisturbed sections of paved roadways shall be installed by boring or other acceptable methods which do not disturb the pavement or its support.

The service shut off will consist of a round way ground key stop, 1" Mueller Oriseal 3H-1504-2 or approved equal, and service shut off box (Tyler 95E or approved equal). The CONTRACTOR, shall provide one curb box key plus wrench (Pollard P—537 and Pollard P-54102 or approved equal) and Clam (Pollard P-527) for each 10 boxes or less. Each meter setting shall be provided with an exclusive and separate service shut off located outside of the home and/or business and within permanent or easement.

- B. Measurement and Payment: For the unit price bid the CONTRACTOR shall furnish all labor, materials; equipment and do all the work necessary to complete the municipal water service connections. This may include but may not be limited to service tape, and curb stops.

9.9 METER ASSEMBLY

- A. Meter Assemblies: Meter assemblies shall be as shown on the following Figures and shall conform to the City of Elkhart minimum requirements in every way. Meter shall be 5/8" Neptune Model T-10 provided complete with ARB remote reader connection meeting with the City of Elkhart's approval. ARB remote reader connection shall be mounted in a conspicuous location outside existing fences acceptable to the City and accessible to City employees at all times. Meters shall under no circumstances be installed in a crawl space or meter pit or any other location which may be defined as a confined space.

Water pressure reducing valves may be required in some installations. Pressure reducing valves will be manufactured by Watt Industrial Model No. 05 or U5B for sizes 1/2" to 2" and be suitable for initial pressured up to 300 psi with a reduced pressure range of 25-75 psi and be set for 50 psi at the factory. Installation of pressure reducing valves will be as directed by the ENGINEER.

Back flow preventers shall be U.S.C. approved and shall be installed on individual property services as directed by the ENGINEER in accordance with the City of Elkhart and I.D.E.M.

Cross connections to water wells shall be permanently eliminated. All plumbing shall be performed by or under the direct supervision of a plumber licensed by the State of Indiana. The CONTRACTOR will obtain all needed permits and schedule the required inspection by the local agency. Plumbing shall be in accordance with the Uniform Building Code with Indiana Amendments and may be subject to local code requirements.

Where homes are found to have a water recirculating home heating or cooling system (heat pump), the ENGINEER will be notified so that elimination of cross connections to the potable supply lines can be properly verified or approved.

The CONTRACTOR shall have an emergency water supply available at all times in case part of the City water system has to be shut down after homes have been connected.

- B. Measurement and Payment: For the unit price bid the CONTRACTOR shall furnish all labor, materials, equipment and do all the work necessary to complete the municipal water service connections.

This may include but may not be limited to service house leads, pressure reducing valves, meter assemblies including remote reading devices, backflow preventers if required, and all necessary interior plumbing alterations to connect the home or business to the water main.

PART 10 TESTS

10.1 TESTING AND SAMPLING

- A. It is the CONTRACTOR's duty to provide testing on representative samples, if so requested by the ENGINEER or duly authorized assistant. One representative sample should be taken for every one-thousand lineal feet of roadway or portion thereof. The CONTRACTOR must also verify that the samples are properly identified with the time, date, and location of the source. The CONTRACTOR should be familiar with procedures for the tests that the CONTRACTOR must conduct and is thus responsible to follow those procedures to ensure accurate test results. If laboratory testing of samples is required, then the CONTRACTOR is responsible to ensure that the tests are conducted by an approved organization and the results promptly given to the ENGINEER to be evaluated.
- B. Any costs incurred by the CONTRACTOR to provide the following tests will be incidental to the Contract. The following tests are to be conducted if applicable:
 - 1. Hot Asphaltic Concrete Pavement Tests:
 - 1. Extraction Test: AASHTO T 168.
 - 2. Sieve Analysis Test: AASHTO T 11, T 27.
 - 3. Density and Stability Analysis: AASHTO T 209, T 245, or T 246, and T 247.
 - 2. The size of the sample shall be governed by the maximum size of the particle of mineral aggregate in the mixture. The minimum size of the sample must conform to the requirements shown below:

Maximum Size Particle

Minimum Area of Compacted Mixture

No. 10	36 sq. in.
No. 4	36
3/8 in.	36
½ in.	64
¾ in.	100
1 in.	144
1 ½ in.	144
2 in.	225

3. Portland Cement Concrete Pavement Tests:

1. Yield Test: AASHTO T 121.
2. Slump Test: AASHTO T 119.
3. Air Test; AASHTO T 152.
4. Flexural Test: AASHTO T 97.

4. Compaction Test Requirements:

1. For all areas not within the limits of the proposed road bed. 90%percent standard proctor in 24 inch maximum lifts, 1 test per lift every 500 feet.
2. For all areas within the limits of the proposed road bed. 96% standard proctor in 24 inch maximum lifts with the top 3 feet passing 100% modified proctor, 1 test per lift every 200 feet.

10.2 INFILTRATION-EXFILTRATION

- A. It shall be the intention of these specifications to secure a sewer system including manholes with a minimum amount of infiltration and exfiltration. The maximum allowable infiltration and exfiltration shall be 200 gallons per mile, per inch of diameter of sewer, per 24 hour day, at any time during the day. The joints shall be tight and visible leakage in the joints in excess of that specified above shall be repaired by the CONTRACTOR, at the CONTRACTOR's own expense, by any means found necessary. It shall be the CONTRACTORs responsibility to conduct the necessary tests, or to make arrangements (at no additional cost the Himco Site Trust) for the tests to be made by other qualified parties, to determine if the newly constructed sewer system meets the requirements mentioned above. The infiltration and exfiltration tests shall be made in the presence of the City ENGINEER or his duly authorized agents (the results of the infiltration and exfiltration test on the newly completed sewer must be submitted to the Indiana Department of Environmental Management, within three (3) months of completion of the sewer construction.)

- B. In accordance with the above specifications, the maximum allowable quantity shall be set forth in the following tabulations:

<i>Pipe Diameter</i>	<i>Gal./Day per 1 L.F.</i>
6" x 0.0378787 =	0.2273
8"	0.3030
10"	0.3788
12"	0.4545
15"	0.5682
18"	0.6818
21"	0.7955
24"	0.9091
27"	1.0227
30"	1.1364
33"	1.2500
36"	1.3636
42"	1.5909
48"	1.8182
54"	2.0455
60"	2.2727
66"	2.5000
72"	2.7273

10.3 LOW-PRESSURE AIR TEST

- A. This test shall be performed according to ASTM C 828. This practice for testing shall be performed on lines after connection laterals, if any, have been plugged and braced adequately to withstand the test pressure, and after the trenches have been backfilled for a sufficient time to generate a significant portion of the ultimate trench load on the pipe line. The time between the completion of the backfill operation and air testing shall be determined by the ENGINEER or the ENGINEER's duly authorized agent.

<i>Pipe Diameter (in.)</i>	<i>Time (min/100 ft)</i>
6"	0.7
8"	1.2
10"	1.5
12"	1.8
15"	2.1
18"	2.4
21"	3.0

<i>Pipe Diameter (in.)</i>	<i>Time (min/100 ft)</i>
24"	3.6
27"	4.2
30"	4.8
33"	5.4
36"	6.0
39"	6.6
42"	7.3

- B. Plug all openings in the test section. Add air until the internal pressure of the line is raised to approximately 4.0 psi. After this pressure is reached, allow the pressure to stabilize. The pressure will normally drop as the air temperature stabilizes. This usually takes 2 to 5 minutes, depending on the pipe size. The pressure may be reduced to 3.5 psi before starting the test. Start the test when the pressure has stabilized. If the pressure drops more than 1.0 psi during the test time, the line is presumed to have failed the test. If a 1.0 psi drop does not occur within the test time, the line has passed the air test.
- C. Groundwater above the pipe will reduce air loss. If the section of pipe under test shows significant infiltration, the ENGINEER or the ENGINEER's duly authorized agent may require an infiltration test.

10.4 HYDROSTATIC PRESSURE & LEAKAGE TEST

- A. The hydrostatic pressure and leakage test shall be coordinated with the Himco Site Trust and the City of Elkhart prior to filling any pipe. The CONTRACTOR shall advise the Himco Site Trust and the City of Elkhart of the time and place of all tests so that the City may observe.
- B. Pressure Test: All new pipe, or any valved section thereof, shall be subjected to a hydrostatic pressure test. The hydrostatic test pressure shall be 150 pounds per square inch, at the average elevation of the line or section of line under test and corrected to the elevation of the test gauge to determine the required gauge reading during the test. The duration of each pressure test shall be at least two (2) hours.
- C. Procedure: After the pipe is laid and the joints completed, the newly laid pipe or any valved section thereof shall be slowly filled with water. The specified test pressure shall be applied by means of a pump connected to the pipe in a manner satisfactory to the ENGINEER. The pump, pipe connection and all necessary apparatus shall be furnished by the CONTRACTOR. The CONTRACTOR shall furnish all gauges for the test and arrange to have any required taps made. Certification of the CONTRACTOR's gauges may be required by the ENGINEER.
- D. Expelling Air Before Test: Before applying the specified test pressure, all air shall be expelled from the pipe. If hydrants or blow-offs are not available at high places, the CONTRACTOR shall provide the necessary taps at points of highest elevation before the test is made and insert approved plugs after the air has been released and before the pressure test.

Any cracked or defective pipes, fittings or valves discovered in consequence of this pressure test shall be removed and replaced by the CONTRACTOR at his expense with sound material. The hydrostatic pressure test for any pipe section shall be repeated until satisfactory to the ENGINEER.

All joints showing leakage during the test shall be remade until the pipe section meets the test requirements, or it is abandoned.

- E. Leakage Test: A leakage test shall be conducted after the pressure test has been satisfactorily completed. The CONTRACTOR shall furnish the pump, pipe, metering devices, pressure gauges, connections and all other necessary apparatus including the gauge and measuring device and shall furnish all necessary assistance to conduct the test.

Certification of the CONTRACTORs meters and gauges may be required. The duration of each leakage test shall be two (2) hours and during the test the main shall be subjected to a constant pressure of 150 psi.

Leakage is defined as the quantity of water pumped into the newly laid pipe or any valved section thereof, necessary to maintain 150 psi test pressure at the pipe elevation after the pipe has been filled with water and the air expelled. No pipe installation will be accepted until the leakage is less than the number of gallons per hour as determined by the formula:

$$L = \frac{N * D * \sqrt{P}}{3700}$$

in which L equals the allowable leakage, in gallons per hour; N is the number of joints in the length of pipe line tested; D is the nominal diameter of the pipe, in inches and; P is the average test pressure during the leakage test, in pounds per square inch gauge corrected to the pipe elevation.

(The allowable leakage according to this formula is equivalent to twenty-three and three-tenths (23.3) U.S. gallons per twenty-four (24) hours per mile of pipe per inch of nominal pipe diameter for pipe in eighteen (18) foot lengths, evaluated at an average pressure of 150 psi).

Should any test of pipe laid disclose leakage greater than that specified, the CONTRACTOR shall, at his sole expense, locate and repair all defective joints until the leakage is below the specified allowance.

The following tables give allowable leakage in gallons per hour per 100 joints and per 1000 feet of main for various size mains.

**LEAKAGE TEST
ALLOWABLE LEAKAGE PER 100 JOINTS IN GALLONS PER HOUR**

Pipe Size	Avg. Test Pressure 150 psi Leakage per 100 joints	Avg. test pressure 140 psi Leakage per 100 joints
6	1.99	1.92
8	2.65	2.56
10	3.31	3.20
12	3.97	3.84
16	5.30	5.12
20	6.62	6.40
24	7.94	7.68
30	9.93	9.60
36	11.91	11.51

ALLOWABLE LEAKAGE PER 1000' OF MAIN IN GALLONS PER HOUR

Pipe Size	150# Pressure	140# Pressure	130# Pressure	100# Pressure
6	1.10	1.07	1.03	.90
8	1.47	1.42	1.37	1.20
10	1.84	1.78	1.71	1.50
12	2.20	2.13	2.06	1.80
16	2.94	2.84	2.74	2.40
20	3.68	3.55	3.42	3.00
24	4.41	4.26	4.11	3.60
30	5.52	5.33	5.14	4.50

10.5 FIRE FLOW TESTING

- A. To conduct a fire flow test, the following steps shall be followed. (For safety, always stand behind an open hydrant.)
1. The two hydrants nearest the property in question shall be selected with one being designated as the "pressure hydrant" and the other as the "flow hydrant."
 2. The location of the hydrants and the mains supporting them shall be sketched.
 3. Precautions shall be taken to avoid property, pedestrian, and vehicular damage from discharging water by viewing the area around the flow hydrant.
 4. One 2½-inch cap shall be removed from the pressure hydrant and the other caps shall be tightened.
 5. The cap gauge shall be attached to the pressure hydrant.
 6. The pressure hydrant shall be opened fully and trapped air shall be bled off.
 7. The pressure shown on the cap gauge shall be recorded.
 8. One 2½-inch cap shall be removed from the flow hydrant and the other caps shall be tightened.
 9. The orifice size (inside diameter) shall be measured to the nearest 1/16 inch.
 10. The discharge coefficient shall be determined by feeling the interior of the nozzle butt where it is attached to the barrel. If the outlet is smooth and rounded then the discharge coefficient shall be 0.90. If the outlet is square and sharp then the discharge coefficient shall be 0.80. If the outlet is square and projecting into the barrel then the discharge coefficient shall be 0.70.
 11. The flow hydrant shall be opened fully.
 12. The pitot tube shall be placed in the stream after waiting for constant "clear" and consistent flow (no trapped air). The orifice on the pitot blade shall be placed in the center of the stream and the edge of the pitot blade shall be placed one-half the diameter of the nozzle butt away from the nozzle butt. The velocity pressure reading shall be taken and recorded.

13. A second pressure reading (residual pressure) shall be taken on the pressure hydrant while the pitot reading is being taken on the flow hydrant and it shall be recorded.
 14. If the pressure drop of the residual pressure on the pressure hydrant is less than 25 percent of the original static pressure then the flow hydrant shall be shut down and two 2½-inch nozzle butts shall be opened and a new set of pitot readings shall be taken. 2½-inch nozzle butts on additional flow hydrant(s) shall continue to be opened until the 25 percent figure is reached. The pitot readings for every nozzle flow must be recorded to determine the total water flow.
 15. Both hydrants shall be slowly closed while at the same time, the bleed-off cock on the pressure hydrant shall be opened to allow for proper drainage.
 16. Both hydrants shall be drained fully by making sure that the water has passed below the level of the "steamer" (pumper connection).
 17. The caps shall be replaced and tightened.
- B. The static and residual pressures and corresponding flows shall be determined by following the pitot gauge manufacturer's guidelines.

PART 11 RECORD DRAWINGS

- A. This item shall be included in all projects. A drawing of record showing the information on all sanitary and storm sewer and water main utilities.
- B. The water main information shall consist of the following items located:
1. Location and depth of water main.
 2. Location and depth of water services.
 3. Location of all water valves.
 4. Location of all fire hydrants.
 5. Location of any "TEE" or "CROSS" connections.
 6. Location of any reducers.
 7. Location of any crossing with other utilities (i.e., sanitary, gas, telephone, electric, etc.).
- C. The sanitary and storm sewer information shall consist of the following items located:
1. Location and inverts of all manholes.
 2. Sizes, lengths, type and slopes of all pipes.
 3. Location and inverts of all catch basins and inlets.

4. Location and depth of all sanitary service laterals.
 5. Location of any crossing with other utilities (i.e. water, gas, telephone, electric, etc.).
- D. All projects shall have the following performed before final acceptance of the utilities is accepted:
1. All water services and sanitary laterals shall have a "W" for water and a "Y" for sewer cut into the curb for all construction projects. If curb is not available it shall be cut into the sidewalk or the edge of the pavement:
 1. The "W" and "Y" shall be at least 2" wide and 2" high.
 2. If curb, sidewalk or pavement is not completed at the time of installation, the installer shall return and install marking after it is in place.
 2. All record drawings shall be submitted with a hard copy and a disk copy on AutoCAD Release 12 or 13 before final acceptance is made.
 3. All driveways and drive approaches shall be marked if affected by what was installed (i.e., hot asphaltic concrete, gravel or Concrete).

END OF SECTION